AIRPORT TERMINAL

FINAL REPORT

PREPARED FOR:

DR. MESSNER

4/7/09

EASTERN

UNITED STATES

CONSTRUCTION MANAGEMENT OPTION

http://www.engr.psu.edu/ae/thesis/portfolios/2009/pdy103/index.html

PAUL YINGLING

Airport Terminal

General

- Muti-Use Facility
  - Office Space
  - Security Checkpoint
  - Baggage Handling
- 4 Stories
- 250,000 Square Feet
- $185 Million
- 300' long Poured Terrazzo curved corridor to correct elevation differences between adjoining buildings

Project Team

- DDI Architects / Odell Associates
- Owner - Department of Aviation
- CM - Gilbane / McKissack
- GC - Ernest Bock and Sons
- Design - Kbr, BNP Ralph Tyler, Urban Engineering, and Brinjac

Structural System and Envelope

- Steel Columns and Trusses
- Existing Cast-in-Place Columns
- 6" Poured Slab on Deck
- Curtain Wall
  - Glass
  - Metal Panels
- Masonry 1st Floor
- Paradiene 30 CR FR Roofing with an SRI of 87%

Mechanical and Electrical

- Remote Thermal Plant
  - Chillers
  - Boilers
- CRAC Units
- Normal Power
  - 480/277, 3ø, 4 Wire and Ground
- UPS, CPS, and Blue Buss Emergency Power
- Five Hydraulic Elevators

Sustainability

- Interior 3rd Floor LEED® Certification

Eastern United States

Construction Management Option

http://www.engr.psu.edu/ae/thesis/portfolios/2009/pdy103/index.html

Paul Yingling

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Executive Summary

The Airport is one of the largest airports on the eastern seaboard. To ensure their place as one of the most customer-friendly airports in the United States they decided to connect adjacent terminals with an enhanced connector bridge. This report proposes possible construction modifications to the building that relates to course work completed over the past five years of education at The Pennsylvania State University. The analyses are as follows:

- Document Review – to see how further scrutiny of Contract Documents may or may not affect a project
- Panelized Construction – to explore how this form of erection will affect a project
- Pedestrian Flow – to see how the current traffic of pedestrians could be modified
- Alternative Glazing – to explore how the building's envelope could become more energy efficient

Analysis One, Interdisciplinary Document Coordination, researches the current practice of the Gilbane Building Company to asses contract documents before a project is underway and discover possible omissions or errors to reduce the amount of uncertainty that may arise later in the project. An explanation of the procedure is provided and a project specific example is evaluated. The project specific example appraises how the schedule and cost could have possibly been affected if the IDC procedure was implemented.

Panelized Construction, Analysis Two, looks at how the building's existing masonry veneer could be modified. The current cast stone veneer is substituted with an equally aesthetic precast panel. Schedule and cost analyses through both the manufacturer and RS Means help provide the key elements of this research. Dimensional limitations of the delivery method to the site are considered and may affect how the panels are fabricated and erected.

The Structural Breadth, Analysis Three, explores how the sites existing concrete columns could possibly be eliminated. The purpose for this is to demolish the temporary corridor that spans the construction site for added safety for all parties involved. To first have the ability to perform this analysis a pedestrian detour around the job site is proposed to abolish the need for the temporary corridor. Consequently, with the building being erected entirely out of steel creates a more predictable structure while the floors above are being loaded.

The Mechanical Breadth, Alternative Glazing, reintroduces a century old energy efficient design of a dual façade. Due to the current energy crisis many methods, that had been disregarded when energy was inexpensive, are being further studied to bring about a greener future for all. The analysis focuses on the thermal conductivity of a dual façade during winter and summer temperatures and then is compared to the current output of the air handling units.

Credits ♦ Acknowledgements

Airport Project Team

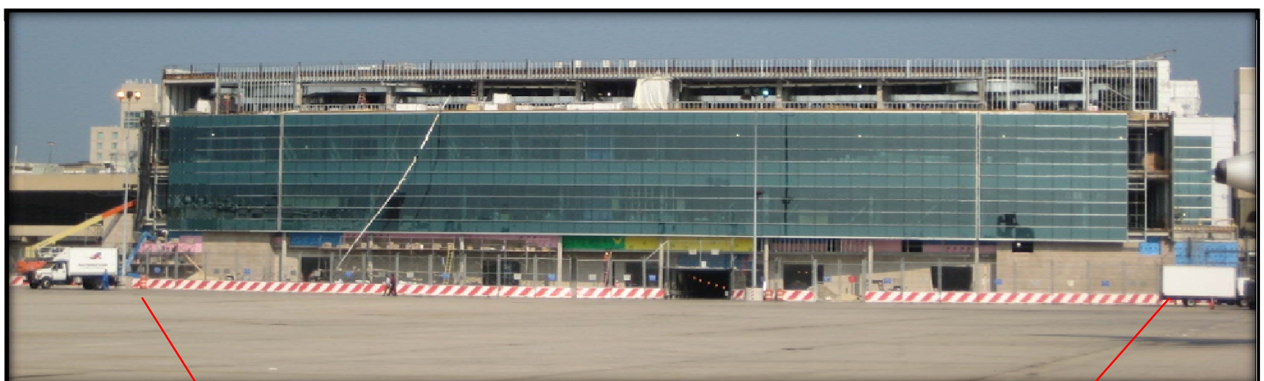
My Parents

All Penn State Faculty and Students

Project Overview

Introduction

The purpose for this project is to connect two adjacent terminals at an airport on the east coast. On the site there was an original connector bridge between the terminals, however, after many years of increased travel through the Airport it was decided to construct an entire building to accommodate the guests. The expansion is four stories and 250,000 gross square feet. The ground floor houses the expanded baggage handling conveyors to accommodate more luggage and to ensure that the bags are properly routed to the correct planes. The second floor includes 14 new security checkpoints and expanded retail space. Since the building is located in a prominent area on the premises, the Department of Aviation offices occupy the third floor. Finally, the fourth floor functions as a mechanical space to serve the building occupants.



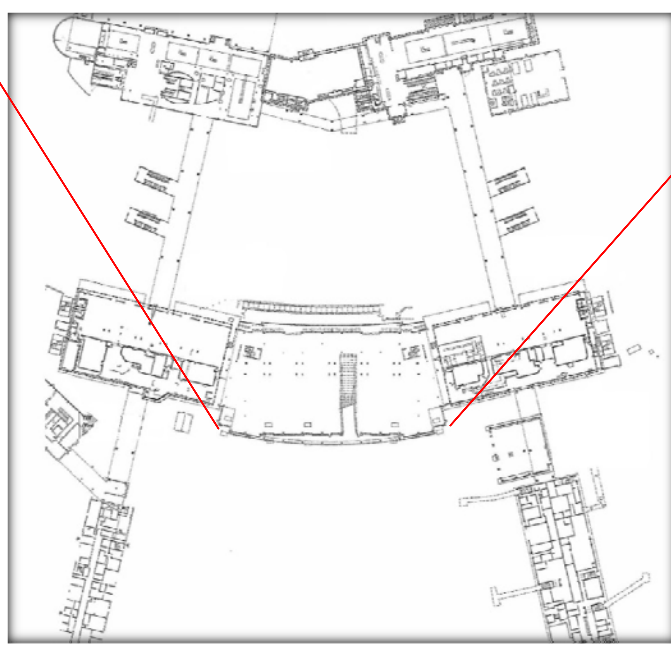
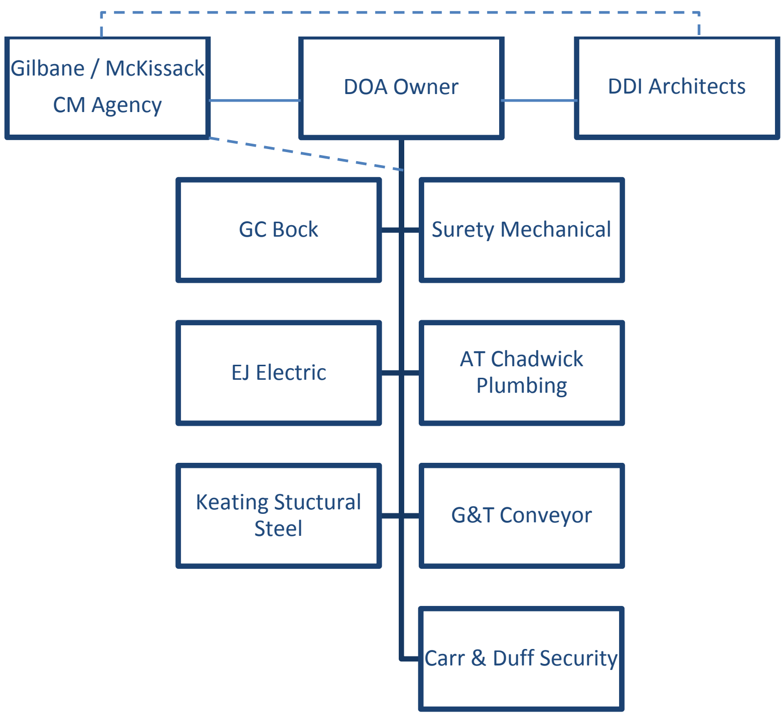


Figure 1: Exterior, airside, orientation to site plan

Client Information

The Department of Aviation is the owner. The mission is to rehabilitate one of the top airports in the country. The airport has been ranked among the top user-friendly airports in the country and through the renovation/expansion the DOA hopes to continue the excellent service to their customers. The increases in checkpoints, expanded baggage handling capacity, and retail stores will ensure the airport's popularity for years to come.

Project Delivery System



The project delivery system is typical of public work projects. Multiple Primes with an overseeing CM Agency to comply with Pennsylvania law. The typical contractor is selected by the lowest bid, that is, if anyone else bids, which was not the case with the GC selection. Bonds and insurance are required on bid day, however kept private. All contracts are lump sum with allowances.

Building Statistics

Structural System

The structural system takes advantage of existing steel piles, as well as, concrete grade beams, mat slab, and columns from the connector bridge between terminals that was demolished. Combinations of both steel and wood piles were used in the subsurface construction of the new building. The slab on grade is bordered with a non-load bearing CMU wall to later be hidden with architectural cast stone veneer. Trusses supported by W14x176 are used on the ground floor to maximize the open space for the complex runs of baggage handling conveyors. The second and third floor of the building uses columns and 26x30 bays with wind connections internally and moment connections on the exterior of the building. The fourth floor consists of trusses. 6 ¼" light weight concrete was originally only to be used on the second floor to ease the deflection of the trusses below, but later was adopted throughout the building.

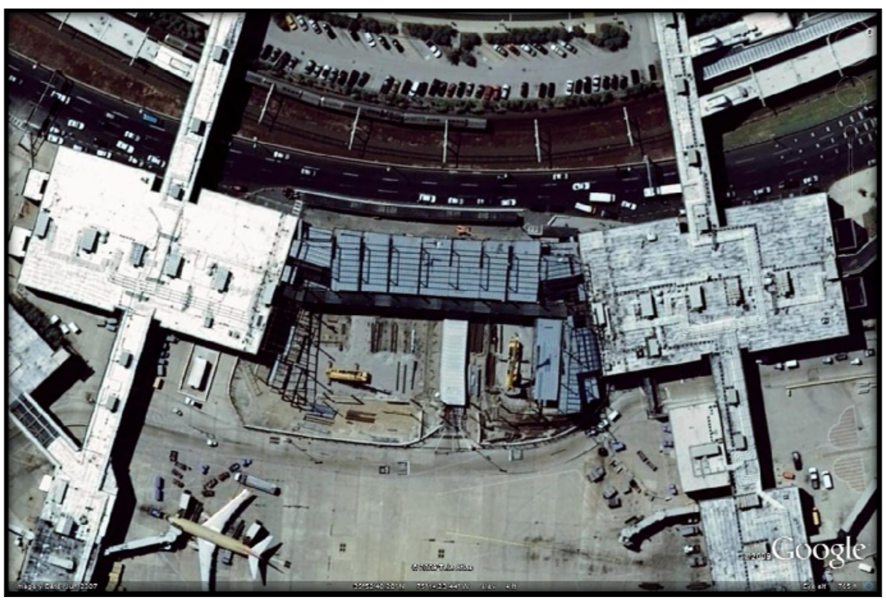


Figure 2: Aerial photo of steel erection

Mechanical

The heating and cooling for the building is provided by redundant boiler and chiller units located at a satellite thermal plant (50,000 MBTU). There is a total of seven 7 AHU's for basic heating and cooling. The combined capacity of all seven units is 8,836 MBTU and 180,000 CFM. For office spaces terminal air boxes and radiant heat are used for individual control of temperature. Data rooms located in the building CRAC units (Computer Room Air Conditioning) are used and independent from the

general building HVAC systems. On the first floor where the Tugs (luggage cars) enter and exit the building nine Air Curtains are used in the winter to ensure indoor temperatures are maintained. Each Air Curtain has a capacity of 557 MBTU and 13,062 CFM.

Electrical/Lighting

Again the power is initially provided from two transformers (2,000A – 480Y/277V) located at the satellite plant, from there the power is sent via duct bank to an underground substation. At the substation power is transferred again to multiple transformers to step the voltage down. One path takes the power to two transformers that step the voltage down for 1000A – 208Y/120V power. The second path takes the power to five oil cooled transformers and steps it down and up to 750A – 480Y/277V or 2500 – 480Y/277V. UPS and 'Blue Buss' systems are also included in this redundant system, as never to have to close the facility for electrical malfunctions or power outages.

Lighting on the first floor for the baggage handling system is primarily 2x4 linear fluorescents and HID wall washers at the transparoll doors for high visibility where the Tugs enter and exit the Building. On the second floor there are again 4' linear fluorescents, as well as, compact fluorescents at the entrance to the wanding stations and neon cove lighting in corridor. The third floor is composed of offices which use a wide variety of architectural and accent lighting; however, they are primarily fluorescents.

Fire Protection

The main system in the building is a wet system. For data rooms an iodine gas system is the first system with heat detectors followed by a backup wet system if the dry system fails. The system reports back to the central fire station for the airport. In the event of a fire, hydrants are located on both the outside perimeter and roof of the building.

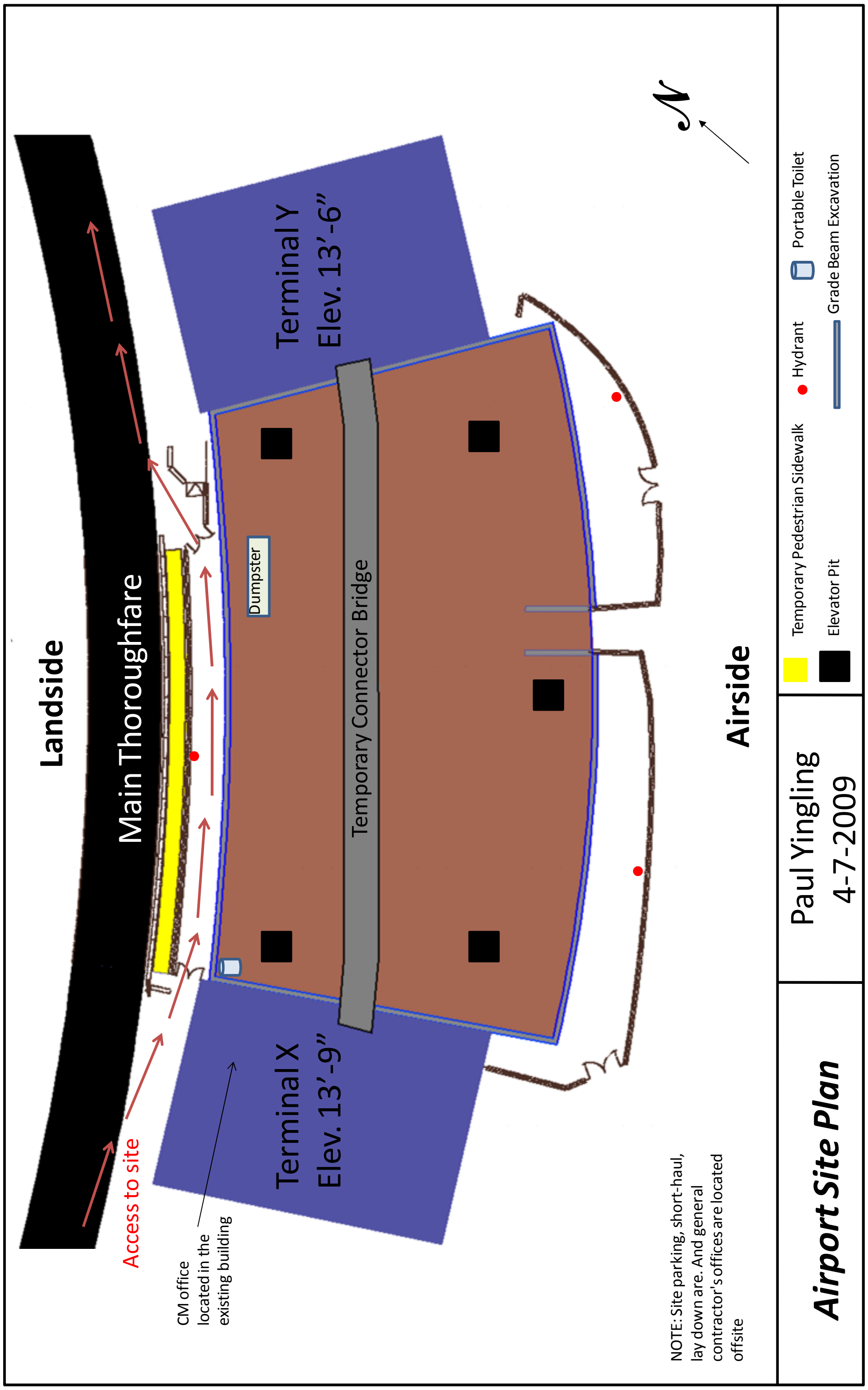
Transportation

There are two holeless hydraulic elevators and three holed hydraulic elevators. All elevators are rated for a load of two tons and speed of 100 fpm. There are four escalators that transport customers from the first floor to the main entrance at 90 fpm. Escalators are required to exceed the national standard (ASME A17.1) by not less the twice the allowable design load.

Building Systems Summary

Yes	No	Work Scope	If yes, address these questions / issues
X		Demolition Required?	• Remove existing pipe columns and concrete grade beams • Remove existing lighting standard, support pier and footing • Remove and salvage existing wall mounted light fixtures & conduit • Demolish entire existing concrete stairwell assembly • Demolish existing loading dock in its entirety including but not limited to: bollards, bumpers, lighting retaining walls, dock levers & all below grade foundations • Remove and salvage existing glazing • Demolish temporary egress corridor structure • Demolish existing exit doors and all associated signage
X		Structural Steel Framing	• A Combination of trusses and columns • 25 ton hydraulic crane for steel erection
X		Cast in Place Concrete	• Plywood and Metal Forming • Steel reinforce Grade 60 • Plain-Steel Wire: ASTM A 82, galvanized
	X	Precast Concrete	
X		Mechanical System	• Remote Thermal Plant
X		Electrical System	• 480/277 3ϕ 3200A • UPS backup • CPS backup • Blue Buss backup
X		Masonry	• Stone Veneer • Non load bearing • Walk through masonry scaffold • Vertical Support #6 @ 24”
X		Curtain Wall	• Stick built • Fire rated • Insulated
	X	Support of Excavation	• Existing conditions

Site Plan


Landside
Main Thoroughfare
Terminal Y
Elev. 13'-6"
Dumpster
Temporary Connector Bridge
Terminal X
Elev. 13'-9"
Access to site
CM office located in the existing building
Airside
N
NOTE: Site parking, short-haul, lay down are. And general contractor's offices are located offsite
Temporary Pedestrian Sidewalk
Elevator Pit
Hydrant
Grade Beam Excavation
Portable Toilet
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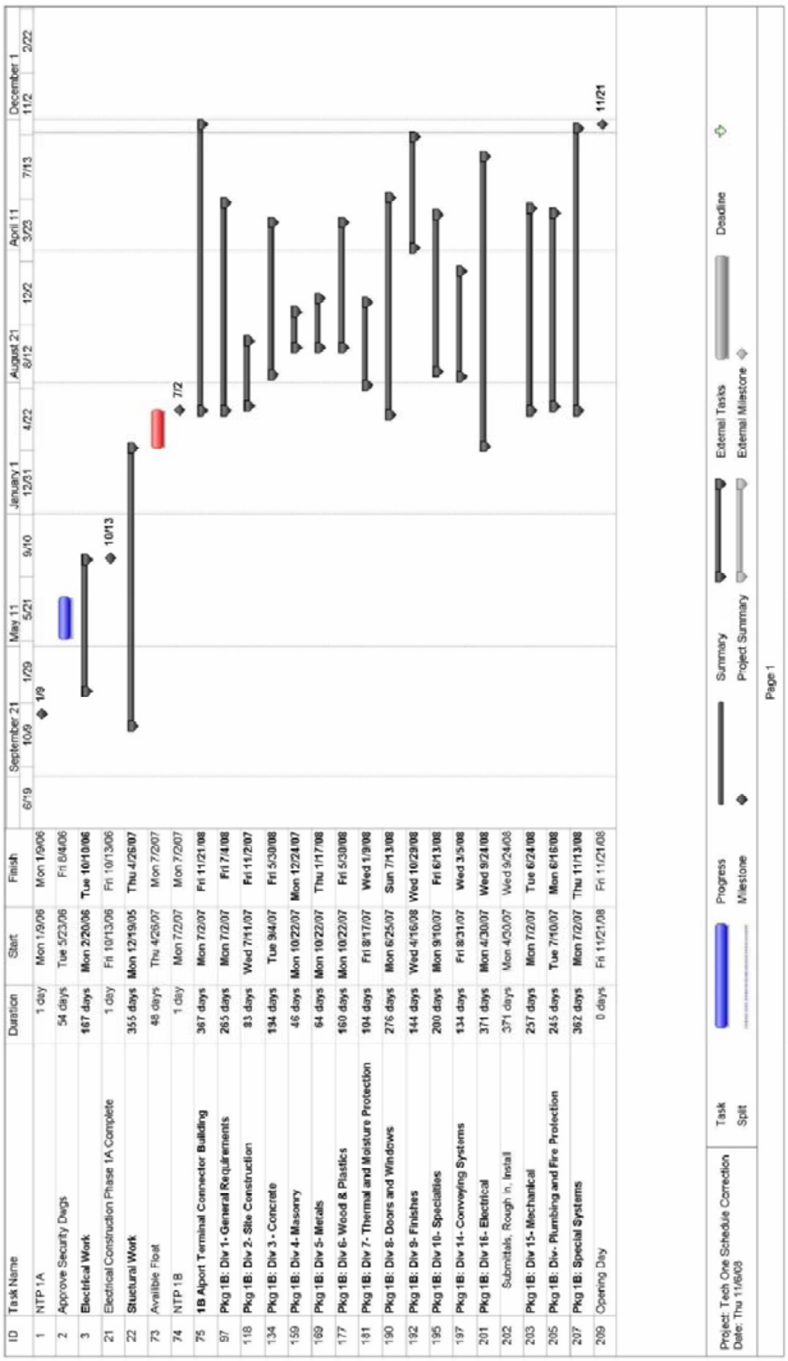
4-7-2009
Airport Site Plan

Schedule

(See Appendix A for Detailed Schedule)



ID	Task Name	Duration	Start	Finish
1	NTP 1A	1 day	Mon 1/9/06	Mon 1/9/06
2	Approve Security Dwgs	54 days	Tue 5/23/06	Fri 8/4/06
3	Electrical Work	167 days	Mon 2/20/06	Tue 10/10/06
21	Electrical Construction Phase 1A Complete	1 day	Fri 10/13/06	Fri 10/13/06
22	Stuctural Work	355 days	Mon 12/19/05	Thu 4/26/07
73	Availble Float	48 days	Thu 4/26/07	Mon 7/2/07
74	NTP 1B	1 day	Mon 7/2/07	Mon 7/2/07
75	1B Aiport Terminal Connector Building	367 days	Mon 7/2/07	Fri 11/21/08
97	Pkg 1B: Div 1- General Requirements	265 days	Mon 7/2/07	Fri 7/4/08
118	Pkg 1B: Div 2- Site Construction	83 days	Wed 7/11/07	Fri 11/2/07
134	Pkg 1B: Div 3 - Concrete	194 days	Tue 9/4/07	Fri 5/30/08
159	Pkg 1B: Div 4- Masonry	46 days	Mon 10/22/07	Mon 12/24/07
169	Pkg 1B: Div 5- Metals	64 days	Mon 10/22/07	Thu 1/17/08
177	Pkg 1B: Div 6- Wood & Plastics	160 days	Mon 10/22/07	Fri 5/30/08
181	Pkg 1B: Div 7- Thermal and Moisture Protection	104 days	Fri 8/17/07	Wed 1/9/08
190	Pkg 1B: Div 8- Doors and Windows	276 days	Mon 6/25/07	Sun 7/13/08
192	Pkg 1B: Div 9- Finishes	144 days	Wed 4/16/08	Wed 10/29/08
195	Pkg 1B: Div 10- Specialties	200 days	Mon 9/10/07	Fri 6/13/08
197	Pkg 1B: Div 14- Conveying Systems	134 days	Fri 8/31/07	Wed 3/5/08
201	Pkg 1B: Div 16- Electrical	371 days	Mon 4/30/07	Wed 9/24/08
202	Submittals, Rough in, Install	371 days	Mon 4/30/07	Wed 9/24/08
203	Pkg 1B: Div 15- Mechanical	257 days	Mon 7/2/07	Tue 6/24/08
205	Pkg 1B: Div- Plumbing and Fire Protection	245 days	Tue 7/10/07	Mon 6/16/08
207	Pkg 1B: Special Systems	362 days	Mon 7/2/07	Thu 11/13/08
209	Opening Day	0 days	Fri 11/21/08	Fri 11/21/08

General Conditions Estimate

CODE	NAME	UNIT	COST	DURATION	TOTAL
01 11 31.20 (0010)	Construction Management Fees	1%			$185,000.00
01 31 13.20 (0020)	Clerk	Week	$590.00	58	$34,220.00
01 31 13.20 (0180)	Project Manager	Week	$2,975.00	58	$172,550.00
01 31 13.20 (0100)	Project Engineer 1A	Week	$2,100.00	40	$84,000.00
01 31 13.20 (0100)	Project Engineer 1A	Week	$1,375.00	40	$55,000.00
01 31 13.20 (0100)	Project Engineer 1B	Week	$2,100.00	16	$33,600.00
01 31 13.20 (0100)	Project Engineer 1B	Week	$1,375.00	16	$22,000.00
01 31 13.20 (0240)	General Superintendent	Week	$3,125.00	58	$181,250.00
01 31 13.20 (0240)	Superintendent 1A	Week	$2,750.00	40	$110,000.00
01 31 13.20 (0240)	Superintendent 1B	Week	$2,750.00	8	$22,000.00
01 31 13.20 (0240)	Superintendent 1B	Week	$2,750.00	8	$22,000.00
01 31 13.20 (0240)	Superintendent 1B	Week	$2,750.00	18	$49,500.00
01 31 13.20 (0240)	Superintendent 1B	Week	$2,750.00	18	$49,500.00
01 31 13.20 (0240)	Superintendent 1B	Week	$2,750.00	18	$49,500.00
01 31 13.20 (0240)	Superintendent 1B	Week	$2,750.00	18	$49,500.00
01 31 13.20 (0240)	Superintendent 1B	Week	$2,750.00	18	$49,500.00
01 31 13.20 (0240)	Superintendent 1B	Week	$2,750.00	18	$49,500.00
01 31 13.20 (0240)	Superintendent 1B	Week	$2,750.00	18	$49,500.00
01 31 13.20 (0290)	Scheduler	Week	$1,600.00	80	$128,000.00
01 32 13.50 (0650)	Scheduling Large Job	0.03%			$55,000.00
01 52 13.40 (0100)	Office Equipment	Month	$171.00	14.5	$2,479.50
01 52 13.40 (0120)	Office Supplies	Month	$93.50	14.5	$1,355.75
01 52 13.40 (0140)	Telephone Bill	Month	$88.00	14.5	$1,276.00

	SUBTOTAL	$	1,456,231.25
Allowances (16.15%)		$	1,691,412.60
Labor Burden (39%)		$	2,351,063.51
Fee:		$	2,586,169.86
	TOTAL	**$**	**2,586,169.86**

Analysis One – Interdisciplinary Document Coordination

Gilbane offers the service of a preconstruction document review called Interdisciplinary Document Control. The mission statement by Gilbane for this service is as follows.

> The Document Coordination department will provide multiple types of document analysis by thoroughly understanding and addressing our internal and external Clients' needs through explicitly defined solutions, combining time tested practices with innovative means and methods, in a relentless pursuit of excellence that surpasses our Customers' expectations

This service is offered to the client at cost in hopes that final costs will be lower. At first, this appears to be the same as coordination drawings that are completed in every construction project. However, this process goes above and beyond the mechanical portions of the drawings. This cost saving technique was offered to the owner of the airport but not purchased.

To perform this analysis I will first explain how it works followed by a preliminary evaluation of the drawings to point out a project specific example. In some cases issues were located and found before all the bids were in and continued until the project schedule was affected.

How It Works

The first step is the Pre-Coordination Survey. The process will determine the level of document completion and create an execution strategy for the amount of available information. Information will be identified for construction disciplines that are reasonably complete and ready for review, as well as, design aspects that are incomplete and unsuitable for review. The lead document reviewer will then assign responsibilities and strategy for the review team. This primary survey of the documents will be presented to the project team and or client.

The second step is the Base Review. The review consists of a checklist of over 450 review tasks between 16 distinct construction disciplines. Review durations vary between three to six weeks with a review team of two to five people. The total man hours of the review can range from 300 to 800 depending on the size of the project. The review tasks may be phased depending on: document release, bidding schedule, and construction disciplines' cost impact.

Communication or reporting is important to analyze the electronic versions of the continuously updated contract documents. All parties are encouraged to either use or develop a customized communication mechanism. Through this monitoring of ongoing program changes can be handled in almost real time.

Finally a Debrief Meeting will be scheduled between the IDC team and the design team. The IDC review team presents their findings with the hope of either clarification to the contract documents or changes as necessary. Many of the issues can be resolved at the meeting; however, approximately 10% of the issues are further discussed and rectified as soon as possible.

Unique to this approach is an overall Compliance Check at the end. This process is a comparison of revised documents, addendum, sketches, or bulletins to previously submitted reports to determine if revisions have accrued. Through the use of the previously mentioned communication these areas of concern can be located and checked with little or no loss to the overall schedule of the project.

Project Specific Example

Through the use of the IDC, a preliminary draft found over 750 items that were either missing or incomplete. Many issues were the result of the design documents only being 60% complete. Since the review is subject to the client's construction schedule these drawing updates were subsequently the best representations as the project moved forward. The drawings were done electronically and the ability to make omissions through the use of copy and paste functions was vast, but easily rectified. The example that I will look at is the ability for better communication through the use of the IDC process and the continually updated design documents.

Throughout the project there were various owner modifications to the original design documents. These changes included schedule accelerations and security modifications. The owner modification of revamped security doors and product non-compliance lead to a bulletin being issued. The bulletin detailed how and where new security doors were to be hung; unfortunately, the HVAC ductwork had already been installed on the floor. Therefore there was a need to hang the doors and avoided the existing duct work.

Figure 3: Ductwork obstruction in plenum space

Figure 3 depicts the area in question where new doors needed to be installed. Due to the weight of the doors support was to be provided from above. Unfortunately, the mechanical contractor did not

provide the coordination for the ductwork and agreed to move the duct at cost. Also, Gilbane identified two years prior that there were no sections showing the layering of the ductwork and piping for the entire building. Consequently, this issue was prolonged until the schedule was adversely affected.

Possible IDC Solution and Evaluated Impact

The lack of the contract documents detailing the layering of the HVAC piping and ductwork resulted in a less than efficient solution to the problem of later modifications to the overall design. To resolve the issue several meetings were scheduled to discuss a solution. And for the lack of a better cliché, time is money. Through the use of the IDC program the coordination effort to remediate the issue could have be more streamlined. The overall solution could have been resolved prior to the installation of the ductwork.

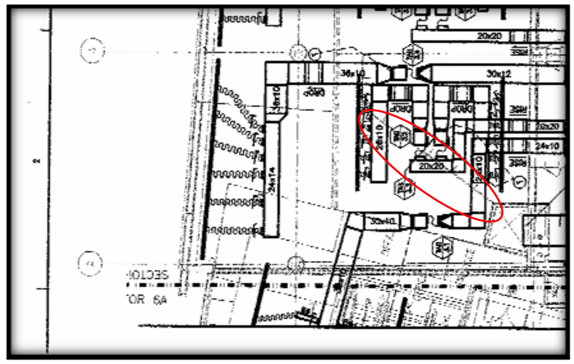


Figure 4: Location where support is needed for glass partition wall

The cost of the IDC procedure to the owner is approximately 10% of the total cost of the project, so in the case of the airport the cost would have been approximately $185,000. Statistical reviews of previous projects have concluded that using the IDC review can reduce potential change orders in the magnitude of 7-10 times the cost of the review. The potential savings for the owner on this project could have range from $1-1.5 million dollars. The ability to predict and modify the design throughout the construction phase is ideal; however, it is also important to recognize the issues before all the bids even come in which is the goal of the review. The analysis of removal and relocation of the ductwork is just one of the 750 issues located two years before the scheduled turnover of the floor in question.

There are two specific locations where the glass door support to the structural steel is needed. The total length of duct to be moved is approximately 20’ of 26x10 metal ducts. RS Means 2009 was used to estimate the cost of the change and it was assumed that the cost to take down the existing ducts were equivalent to the cost associated with installing the ducts. The cost through the use of RS Means 2009 after calculating the total weight of duct is illustrated below:

Duct Size (L+W+1”)	Weight (plf) 22 gauge	Length	Total Weight
37	9.36 lbs	20’	187.2 lbs

RS Means Cost Comparison		
Total Incl. O&P	**Weight**	**Total Cost**
$7.75 per pound	187.5 pounds	$1,453

Removal and Rerouting Total: $3,000

Conclusion

The IDC procedure appears to have many advantages; however the cost saving potential is directly correlated with how complete the design documents are. In the case of the airport some of the designs were incomplete since the security measures are constantly being amended. Another aspect of security that would make this procedure difficult is that some of the design documents are not readily available to distribute for a group review. Therefore I believe in this analysis that the IDC procedure may have aided in the reduction of schedule and overall cost although the Airport is a unique building which may have created unforeseen obstacles that prohibited the implementation of the IDC procedure.

Figure 5: Finished glass partition wall

Analysis Two – Panelized Construction

Figure 6: Cast stone mockup

The purpose of this analysis is to learn the possible advantages of precast panels by replacing the existing cast stone veneer with an aesthetically comparable panel. Panelized construction has claimed to have many cost saving advantages, such as: labor, material, and quality improvement. The labor savings are immediately seen as the factories are mechanized and the onsite material is pieced together with cranes rather than manually pieced together and grouted. With accurate drawings, material savings would result as the manufactured panels generate little to no waste compared to the cast stone that is hand cut in the field. Quality improvement is established by the factory controlled measures that ensure that the color is correct and remains consistent for the duration of the fabrication.

With respect to the airport, the existing cast stone façade required the approval from the architect according to the contract documents and the final approval turned out to be somewhat challenging. After the stone color was eventually approved and installation began the masons noticed that the factory had been delivering two different shades of cast stone. The second issue involved with the stone façade was that the project team had trouble getting the grout color approved. A possible solution for the confusion of getting the proper stone and grout color would be to use precast panels. By using precast panels the submittal would eliminate the need for a mock up since the pseudo cast stone veneer would be assembled as a single panel. As well as, a better chance for the manufacturer to maintain consistent colors in the controlled environment of an offsite fabrication plant.

To perform this analysis a quantity takeoff was performed and found to be that a total of 14,058sqft of cast stone could be replaced with the alternative precast architectural panels. Also, a schedule analysis was performed to identify if there would be any time or cost savings. Finally, an introduction of the quality assurance advantage a precast facade system would have over any potential problems during the submittal process.

Dimensional Limitations

For transport purposes the panels cannot be longer than 12' wide in one direction. Delivery through the use of tractor trailers is the limiting factor so that the vehicles do not require special escorts to have the panels arrive on site. Likewise, there is a 35' limitation on the total length of the long side of the panel. This may become a factor in determining how the panels are fabricated. For example, the

rough opening on the airside of the building is 354’ long and 22’ high. If the panels are oriented vertically the total number of panels would be 30 12’ x 20’ panels. However, if the panels are arranged in horizontal stacks of two 35’ x 11’ panels there would only need to be 22. Reducing the number of total panels consequently reduces the transportation and installation cost.

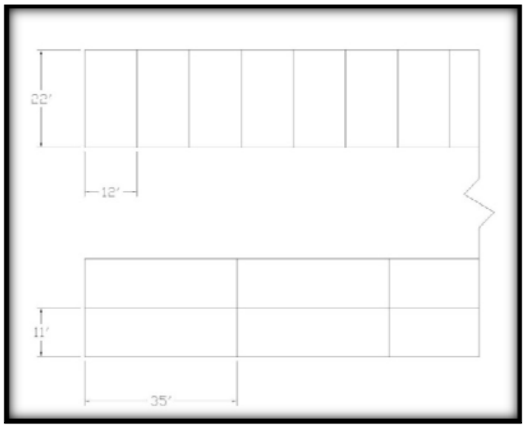


Figure 7: Panel orientation comparison

Cost & Schedule Impact

The cost of the existing cast stone is $57sqft with a total cost of $801,306. The modified panelized construction costs were provided by Nitterhouse at approximately $35sqft (comparable to the cost in RS means $36.68) with a total cost of $492,030. All costs include fabrication, delivery and installation. Therefore the project cost would diminish by approximately $310,000, or 0.2% of the total project. The importance of weather proofing the building as soon as possible is accomplished by tying the panels to the superstructure. Connection details for the installation of the precast are provided in Appendix B. After the panels are installed the CMU can follow. An industry professional suggested eliminating the block wall entirely; unfortunately, the interior use of the building prohibits removal of the CMU.

Figure 8: Airside façade

The original scheduled time period for the cast stone veneer was 40 days. Also, the site congestion was increased by the need for scaffold to aid the manual installation. Using the precast

system would require a lead time of approximately six months and the installation rate of 20 panels per day. The gross area of stone veneer is 14,058 sqft and the required number of panels is 40. Hence, the total time for the installation of the panels would be three days compared to the 40 days allotted in the original schedule. Three days would complete the major portion of the installation followed by the customized column covers that can be coordinated in the field. Overall there would be 37 extra days that, although the stone was not on the critical path, there would be a less congested site that would allow other trades to move in and occupy the space.

Throughout the construction of the cast stone veneer there was a miscommunication with the architect on what the acceptable grout color was and the specifications were vague on the what submittals were required, particularly for the grout color and mock-up size. The manufacturer of the current cast stone veneer suggests that local specifications be used for the contract documents. Unfortunately, the preparers of the contract documents tend to hurriedly copy and paste typical specifications and many times the errors or omissions are not discovered until the installation of the product begins. To ensure the proper grout color, precast could possibly aid in maintaining the proper and consistent color which the architect requests. Precast submittals are the same as cast stone; however, using a precast system there is a greater chance that the aggregate is consistent in color.

Conclusion

Through this analysis there is some support for the alternate method of a precast veneer. The savings are minimal to the total project cost, yet the time to complete the enclosure of the first floor is significant. The submittal specifications are included with the precast system, where as the existing cast stone does not included specifications for the exact type, only typical specifications. The area of writing specifications and the time spent reviewing them would be a subject for further research. I believe through the use of IDC, from analysis one, and a precast system, controversies over what the criterion is for the submittal could have been avoided. Figure 9 is an example of how the variations of custom precast architectural features can be used without removing the aesthetics of a comparable cast stone veneer.

Figure 9: Precast stone veneer example

Analysis Three – Pedestrian Rerouting

Due to the DOA requirement that customers would not be required to exit the building and walk the approximate 300' to the adjacent terminal, the site team had to develop a plan to reroute pedestrian traffic. To accomplish this it was determined that the existing connector bridge would be used until the first temporary corridor was constructed after the steel erection. The problem that developed was that the existing connector bridge was concrete and the design team had to integrate this into the new building. Cracks developed in the existing concrete columns as the building began to be loaded. Onsite superintendants were required to monitor and report on these findings daily. The design considered the existing concrete columns to be zero force members and found the cracks to not be of structural significance. Combining existing concrete into a steel building, as well as, continually constructing and demolishing temporary corridors began to slow the project performance down. In retrospect an alternate method of rerouting the airport customers around the site, instead of straight through the middle of the site, would have accelerated the construction schedule. Also, the existing concrete columns could have been completely demolished and steel erected in place of them to create a more predictable structure.

Figure 10: Temporary Connector Bridge

This analysis focuses on the elimination of the concrete piers and the substitution of a modified steel truss system. The elimination of the temporary connector bridge will save the project approximately $500,000 and create a safer environment for all parties involved. The first accomplishment for this analysis to work is eliminating the pedestrian traffic through the center of the construction site. After the rerouting of the pedestrians has been completed the site will be completely open to accept a modified truss system, provided that the steel calculations are correct.

Pedestrian Rerouting

The Department of Aviation required that the pedestrians have the capability to travel between terminals indoors. To avoid the construction and demolishing of temporary corridors the traffic can be detoured to the bag claim area across the street that is connected to both existing terminals with permanent bridges. The bridges that transport the travelers to the bag claim is supported be a moving walkway that runs approximately 1.4 m/sec. The distance from one terminal to the bag claim is 300';

therefore the total detour is 600'. And the total time that a traveler would have to expend to make their connection would be a little over four minutes.

$$(600\ ft) \text{ x } (0.3048 \frac{m}{ft}) \text{ x } (1.4 \frac{m}{s}) / (60 \frac{s}{min}) = 4.26 \text{ minutes}$$

Also, for able bodied travelers one can simply exit the terminal and walk under an outdoor covered walkway to the next terminal with no delay.

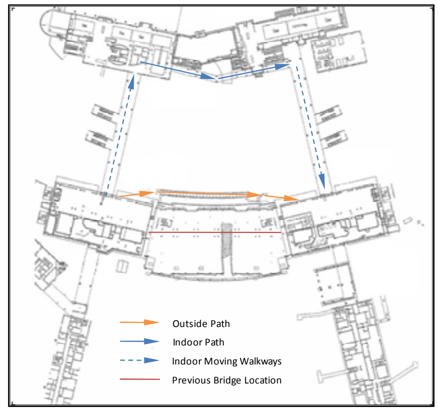
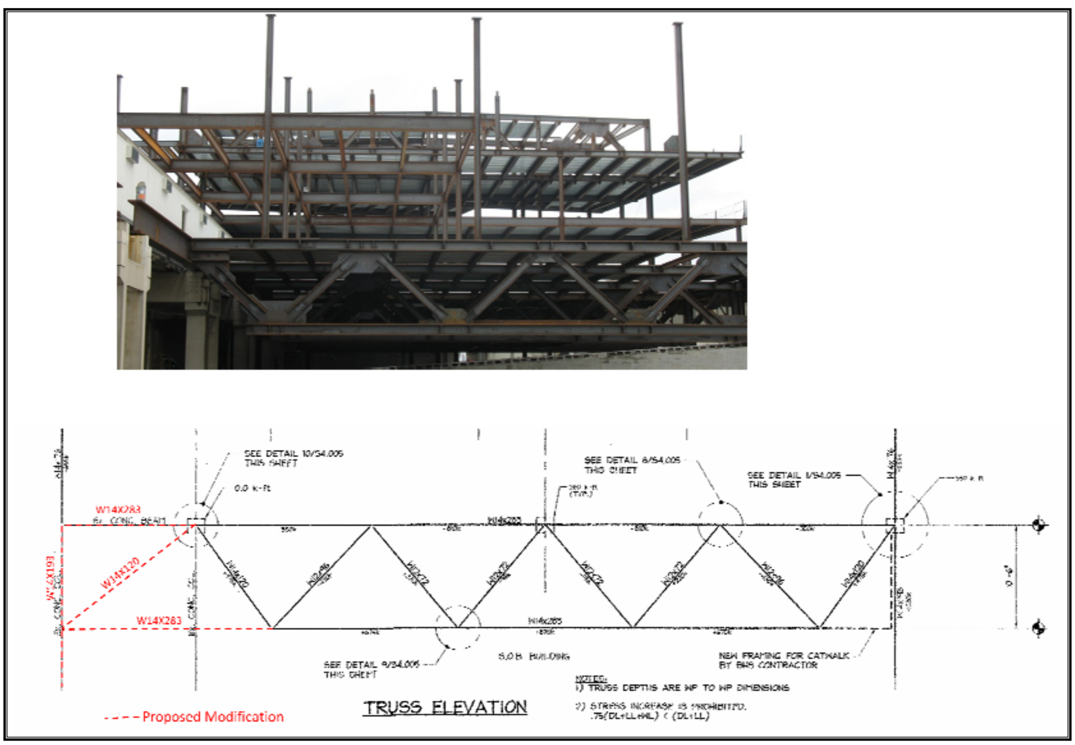


Figure 11: Alternate pedestrian paths

Steel Truss Redesign

Originally work in the area surrounding the temporary bridge through the construction site was conducted between the hours of 1am and 6am. With the elimination of the public traffic through the construction site work is able to proceed during the daytime hours which is less costly for an owner and safer for the workers. Also, with the absence of concrete columns for a more slender steel column space on the ground floor will be available to store and install the complicated baggage handling conveyors.



STAAD Pro was utilized to evaluate the stability of a modified truss illustrated on the previous page. Further structural results from STAAD are shown in Appendix C. The truss was analyzed as a simply supported beam and the maximum deflection value, 0.707”, was compared to the L/360 value of 3.56”. Therefore the truss modification appears to be plausible when analyzed as a simply supported beam. With the original RFI issued for shear appears be resolved by a steel connection extend to the W14X193.

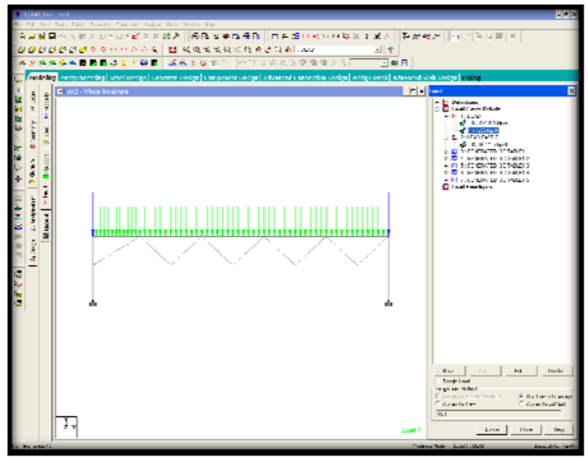


Figure 12: STAAD loading diagram

Node Displacement Summary

	Node	L/C	X (in)	Y (in)	Z (in)	Resultant (in)	rX (rad)	rY (rad)	rZ (rad)
Max X	9	2:LOAD CASE	**0.004**	-0.112	0.000	0.112	0.000	0.000	0.000
Min X	1	4:GENERATEI	**-0.134**	-0.085	0.000	0.159	0.000	0.000	0.000
Max Y	12	1:DEAD	0.000	**0.000**	0.000	0.000	0.000	0.000	0.000
Min Y	6	4:GENERATEI	-0.071	**-0.707**	0.000	0.711	0.000	0.000	0.000
Max Z	1	1:DEAD	-0.019	-0.061	**0.000**	0.064	0.000	0.000	0.000
Min Z	1	1:DEAD	-0.019	-0.061	**0.000**	0.064	0.000	0.000	0.000
Max rX	1	1:DEAD	-0.019	-0.061	0.000	0.064	**0.000**	0.000	0.000
Min rX	1	1:DEAD	-0.019	-0.061	0.000	0.064	**0.000**	0.000	0.000
Max rY	1	1:DEAD	-0.019	-0.061	0.000	0.064	0.000	**0.000**	0.000
Min rY	1	1:DEAD	-0.019	-0.061	0.000	0.064	0.000	**0.000**	0.000
Max rZ	1	1:DEAD	-0.019	-0.061	0.000	0.064	0.000	0.000	**0.000**
Min rZ	1	1:DEAD	-0.019	-0.061	0.000	0.064	0.000	0.000	**0.000**
Max Rst	6	4:GENERATEI	-0.071	-0.707	0.000	**0.711**	0.000	0.000	0.000

The total number of trusses in the building is eight. The modification consists of:

Member Type	Member Length		Weight
W14X120	19.96’		2395.20 lbs
W14X193	22.50’		4342.50 lbs
W14X283	17.00’		4811.00 lbs
		Total weight	**5.77 tons**

The total weight for the entire modification would be 46 tons. Cost requirements for installation and are assumed to be zero, requiring only the material be priced since the crane is already to be scheduled onsite. Pricing information provided by RS Means 2009 at $2,338 per ton results in a total price of $108,003. The cost for the modification is lower than the total cost of the temporary bridge construction.

Conclusion

The ability for an owner to allow the change of pedestrian rerouting is difficult. Through the evaluation of the schedule the temporary corridors appear not to affect the critical path. From the site consideration for forming the slab on grade around the existing concrete columns to the lack of a fully predictable steel structure, evaluation of the total time that could be saved is abstract; however, approximately 27 working days were directly affected by the continual pedestrian traffic through an active construction zone. Estimates of the total cost saving for this change would be approximately $391,997; although, with a project cost of $185million this change would only represent 0.21 percent of the total project. Therefore, I feel that in the public's perception of a longer detour and potential to miss a connecting flight it was in the best interest for the owner to provide a direct temporary path between terminals.

The structural calculations as presented could be an area for further research. The truss system was evaluated as a simply support beam, rather than how it interacts with the remainder of the building. Also, there is a complex baggage handling and screening conveyor system on the first floor which had yet to be fully designed at the time of this report. Design on whether or not the conveyors could be supported from the floor or hang from the truss system have yet to be determined. To date there have been two such structural cases directly related to the existence of the concrete columns. Figure 13 is an illustration of one such case and the recommendation from the structural engineer to install bearing plates that are attached to the existing column. The magnitude of the change order in this case could have been lessened or all together eliminated if the structure was entirely steel.

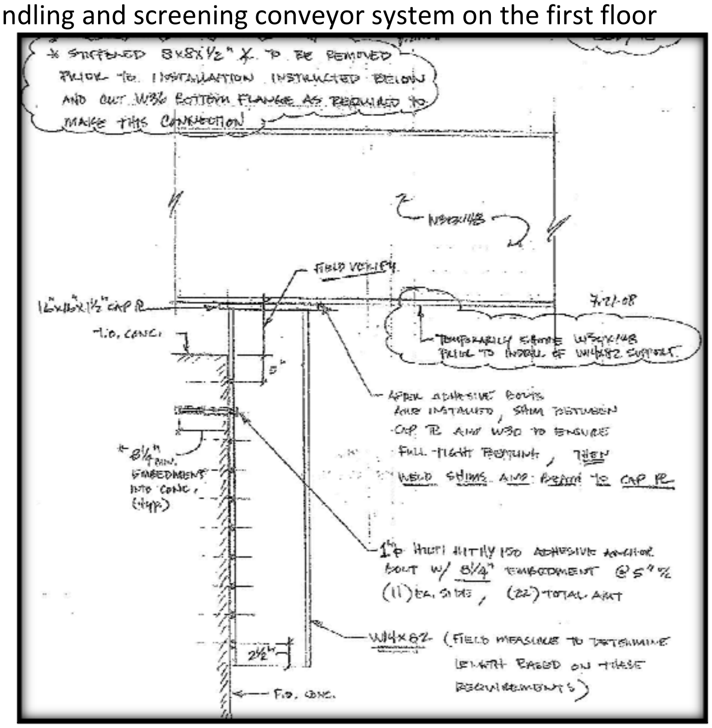


Figure 13: Steel modification

Analysis Four – Alternative Glazing

With the ever rising energy costs in America, the need for an efficient building has become a critical industry issue. The concern for the airport is that the architectural aesthetics may be compromised with an attempt to create a more energy efficient building. To make the analysis even more complicated the main thermal losses in a building occur at the exterior glazing, which happens to be this buildings key feature. With more than half the building's façade consisting of a glass curtain wall this analysis focuses on two possible ways to keep the architectural feature and create a more energy efficient building. The two systems researched are the use of a dual façade and the plausibility of using photovoltaic cells on the south facing portion of the buildings' façade.

Dual Façade

The idea of dual façade has been around for over a hundred years, but has yet to fully break into the American market. The Europeans have made use of the dual façade technique for some time now with the foremost manufacturer Permasteelisa, located in Italy. The basic idea is to have airspace from a few inches to a few feet to insulate the building. Additions to this idea have included shades to control the amount of light entering the building, as well as, louvers on the top and bottom of the façade to allow hotter air to vent through the top of the façade during the summer months. As the industry has not fully adopted the method of dual-facades, there may be other modifications to this technique that could be explored through further research. A current and local example of the use of a dual-façade is at the University of Pennsylvania's Levine Hall. "We realized we could achieve a nearly fully glazed exterior envelope while meeting or exceeding energy code requirements," says Richard Maimon, associate in charge with project architect Kieran Timberlake Associates, Philadelphia.(Gorden 2005)

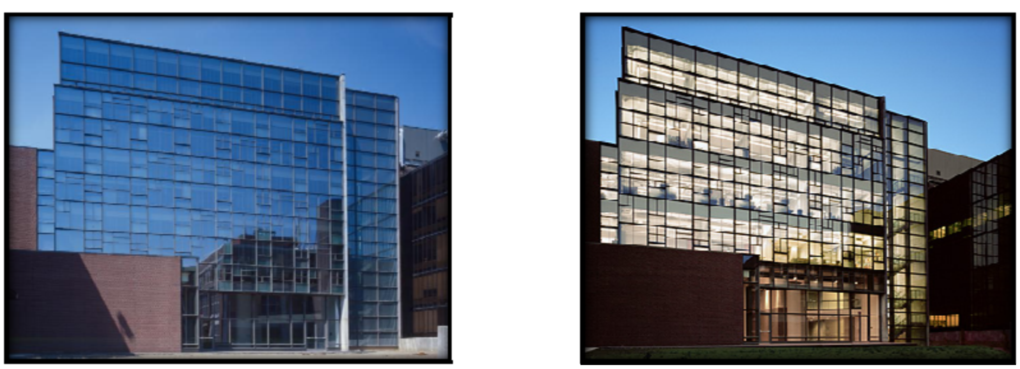


Figure 14: Levine Hall, Pennsylvania University

Advantages from the utilization of a dual façade for an airport setting include, but are not limited to:

- Noise reduction with the close proximity to the tarmac
- Improved insulation and reduced heating loads / costs
- Architectural intent is modified, rather than eliminated, for higher energy performance

There are many variations of how a dual façade can be implemented, for the purpose of this analysis the façade will be defined as a naturally ventilated façade that relies on the stack effect with an airtight internal facade and a non-airtight external façade. The façade is attached to the structure in a cantilever fashion shown below.

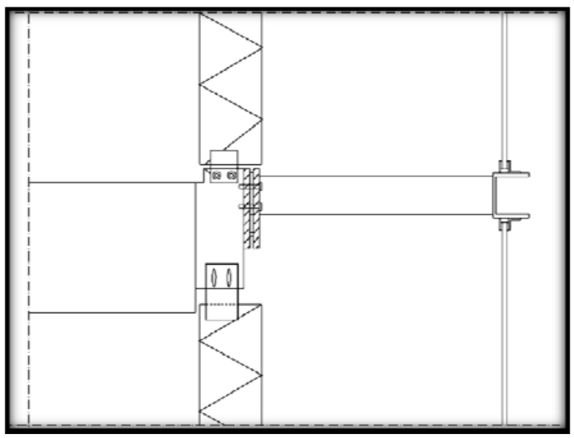


Figure 15: Cantilever connection for dual-facade

Modification

The current curtain wall consists of ¼" green VE2-55 #2 with a ½" airspace and ¼" clear glass interior. The performance specifications are presented in Appendix D and the manufacturer was Viracon, Inc. to maintain consistence with the official specifications. To perform the analysis it will be assumed that the existing glass will be used as the exterior of the double skin to maintain the architectural aesthetics. However, from a constructability aspect the glass will only be laminated, rather than the insulated. Therefore the airspace between panes will be reduced from ½" to 0.030". The interior is uncoated ¼" clear glass with ½" airspace in between panes (see Appendix C). To properly control the temperature in the cavity there are louvers installed that can be open in the summer to allow for the stack effect to exhaust the hot air and in the winter the louvers will close to allow for the air to be continuously heated (see Figure 17). Application of the dual façade will occur on the south façade only (8,650 sqft).

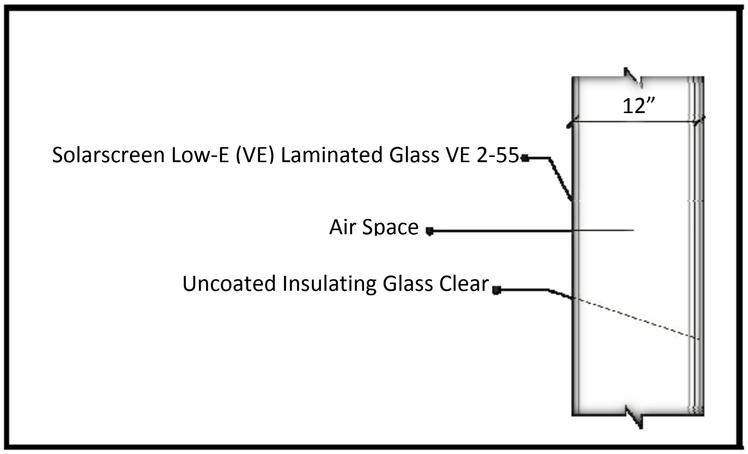


Figure 16: Dual-facade makeup diagram

R-Value Calculation

The window make-up specifications identify both the summer and winter U-Values and the resulting R-Values are reciprocated, illustrated in tables below.

Material	**U-Value** $\left[\frac{Btu}{ft^2 \cdot {}^\circ F \cdot hr}\right]$		**R-Value** $\left[\frac{ft^2 \cdot {}^\circ F \cdot hr}{Btu}\right]$	
	Winter Conditions	Summer Conditions	Winter Conditions	Summer Conditions
Existing – Silk-Screened Low-E (VE) Insulating glass (50% Coverage V933) VE 2-55	0.310	0.290	3.23	3.45

Material	**U-Value** $\left[\frac{Btu}{ft^2 \cdot {}^\circ F \cdot hr}\right]$		**R-Value** $\left[\frac{ft^2 \cdot {}^\circ F \cdot hr}{Btu}\right]$	
	Winter Conditions	Summer Conditions	Winter Conditions	Summer Conditions
Exterior – Solarscreen Low-E (VE) Laminated Glass VE 2-55	0.970	0.880	1.03	1.13

12" Airspace (sealed in winter and open in summer)	0.017	4.55	60	12
Interior – Uncoated Insulating Glass Clear	0.470	0.490	2.13	2.04
Totals:	**0.016**	**0.066**	**63.16**	**15.17**

The U-Values are used to calculate the total Btu/hr of heat loss depending on the season and the temperature difference. By multiplying the U-value by the total square feet of the curtain wall a rough estimation is found for the total corrective measures the air handling units will have to provide. The mean temperature difference between the indoor temperature and the outdoor temperature is assumed to be 55˚ in the winter and 19˚ in the summer, shown below (values are taken from ASHRAE Fundamentals 2001.

Season	Outdoor Temperature ˚F	Indoor Temperature ˚F	Temperature Difference ˚F
Winter	15	70	55
Summer	89	70	19

Winter Conditions	U-Value $\left[\frac{Btu}{ft^2 \cdot {}^\circ F \cdot hr}\right]$	Temperature Difference ˚F	Area ft^2	Total $\frac{Btu}{hr}$
Existing – Silk-Screened Low-E (VE) Insulating glass (50% Coverage V933) VE 2-55	0.310	55	8650	147483.00
Dual Facade	0.016	55	8650	7612.00

Summer Conditions	U-Value $\left[\frac{Btu}{ft^2 \cdot {}^\circ F \cdot hr}\right]$	Temperature Difference °F	Area ft^2	Total $\frac{Btu}{hr}$
Existing – Silk-Screened Low-E (VE) Insulating glass (50% Coverage V933) VE 2-55	0.290	19	8650	47661.50
Dual Facade	0.066	19	8650	10847.1

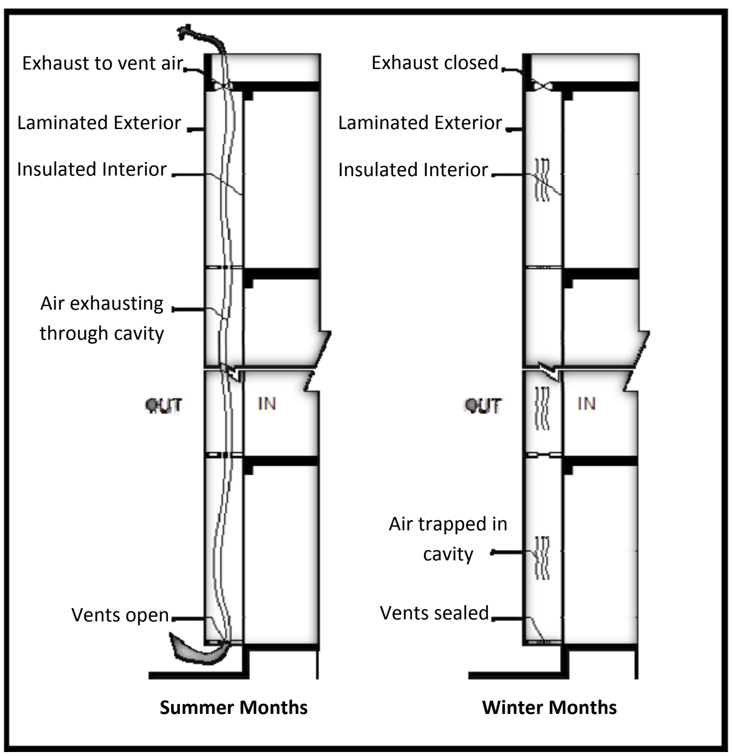


Figure 17: Dual-façade seasonal operation sections

Impact of Change

The implementation of the dual- façade reduces the heat loss in the winter by 32%, and in the summer by 23%. Overall, the building appears to be more efficient. The total cost of the exterior

façade, via a square foot estimate out of RS Means ($57.10 per sqft), is $493,915. The following table illustrates the per year savings with the implementation of a dual-façade.

	Months	Btu saved with Dual Façade per month	Cost per Million Btu per month*	Total Savings per year
Winter	5	71.87 million	$365.40	$131,309
Summer	7	26.51 million	$936.30	$173,749
			Total:	**$305,058**

**Prices obtain from the US Department of Energy*

Photovoltaic Cells

The airport already controls the amount of day lighting through the use of screen printed glass. To increase the amount of light that the airport controls would be the use of photovoltaic glass. The concept is that the glass is imbedded with tiny solar cells that can be integrated into the terminals power supply. Unfortunately, the electrical demand of the building is so large that it may shadow the potential benefit of photovoltaic cells. The possible downfall of the efficient aspect may create a unique opportunity for the architectural aesthetics of the building. To this end, an example would be the GREENPIX Zero Energy Media Wall in Beijing China. The story behind the building is to represent the willingness of China to follow suit with the rest of the world in becoming more energy savvy. The city is attempting to have all public transportation to have a zero carbon footprint in the coming years and this architectural feature to the building will accent the forward-thinking mentality to all who visit this city. Also, this analysis will further explore the use of a photo-catalytic coating on the glass. Photo-catalytic coatings (titanium dioxide) is used in combination with ultraviolet light to break down dirt, keeping the glass clean for maximum potential from the photovoltaic cells.

Figure 18: GREENPIX

Architectural Modification

To maximize the photovoltaic collector's potential they will be incorporated on the south façade of the building, or airside. The management offices are located on the airside of the building and adding the solar cells on the visible portion of the offices' executive views would not be appropriate; therefore, the airside façade will only have approximately 4725 ft^2 (438.95 m^2)of space to install the cells. The cells will be placed on the façade where the glass is only decorative and not transparent. Again, not to take

away from the architect's original aesthetic intention, Polycrystalline photovoltaic collectors from Ertex Solar were chosen and would blend well with the existing glass.

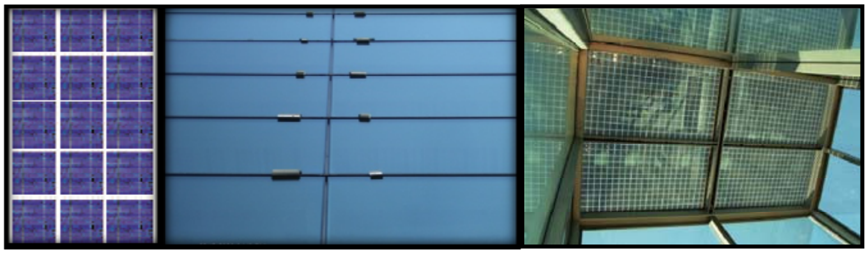


Figure 19: Solar panel comparison to existing architectural glass

Thin films, such as Ertex THRU®, could have been used but the transparency of 10% would not offer the interior offices sufficient lighting.

Calculations

The manufacturer specifications claim that the Polycrystallin has a power producing capacity of 125 W/m^2. The photo-catalytic coatings ensure that the cells operate under optimal conditions. Another advantage of the coating is there is no need to have window washers, since the glass is 'self cleaning', on the south facing airside of the building which is a secured area.

Monthly Daylight Averages (hours)

(Data available on NASA's website)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Average	9.68	10.7	11.9	13.2	14.3	14.9	14.7	13.7	12.5	11.1	10	9.4

Average output for January

$$9.68\text{ h} \cdot 125\,\frac{W}{m^2} \cdot 438.95m^2 \cdot \frac{1\,Kw}{1000\,W} \cdot 31\text{ days} = 16{,}465\text{ kWh}$$

Output per Months (kWh)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Average	16,465	16,439	20,241	21,728	24,323	24,526	25,004	23,303	21,262	18,880	16,461	15,989

Output Comparison to Actual Building Demand	
Total Solar Output per year:	244,621 kWh
Average Building Demand per year:	5,125,000 kWh
Supplemented Polycrystalline Impact:	**4.8%**
	$26,052.10*

Educating the Public

Many people are aware of the current energy crisis but are not educated as what can actually be done to ease the demand on typical fossil fuels. The idea of photovoltaic cells producing enough energy to supply a technologically complex building becomes unrealistic. Therefore, these architectural features can educate the public. The New Jersey State Aquarium is an example of how the public can be introduced on how to make simple modifications to a building to accomplish moderate energy efficient design in the future. The Aquarium has propellers located atop the building's perimeter that capture the air currents off the Delaware River. While guests wait in line to gain admission, similar to waiting for a flight, there are placards located along the path that explain what the propellers are designed to do.

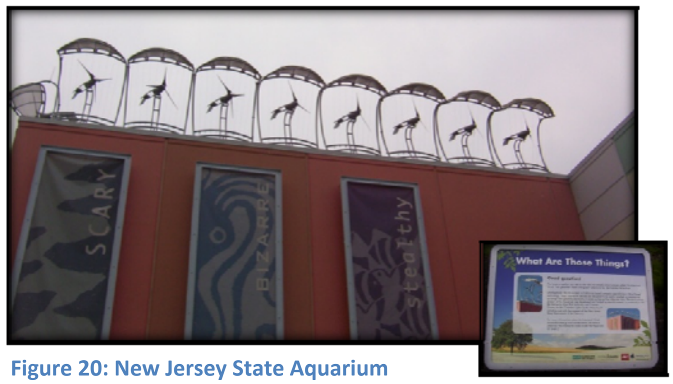


Figure 20: New Jersey State Aquarium

With respect to the airport, a system similar to BIOHAUSE in Paderborn Germany could be used to educate the public. With the cells placed on the south side, airside, of the building it may be difficult to differentiate between glass and the actual solar cells. Therefore, the landside of the building where passengers are unloading and waiting on flights, there could be a system of LEDs to illuminate the building, as well as, placards explaining to the public the advantages of solar power. The hope for this architectural modification would be that the general public eventually becomes aware of energy efficient design, so that it may become common practice.

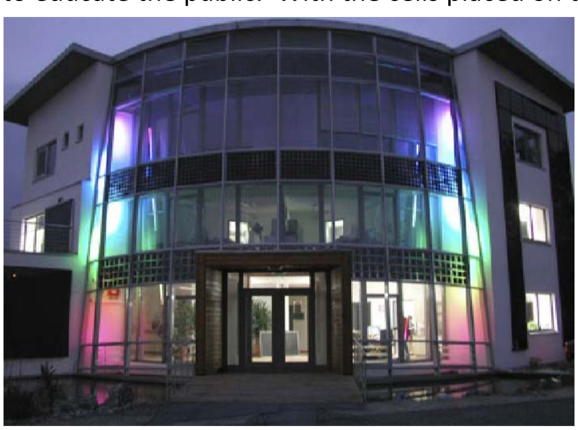


Figure 21: BIOHAUS Paderborn Germany

Conclusion

The implementation of both dual-facades and photovoltaic cells are relatively young concepts in the United States. The introduction of these practices depends on the cost of energy, according to industry professionals in The Partnership for Achieving Construction Excellence. The two systems in this analysis rely on ideal conditions and both have high frontend costs associated with them. The installation of the double skin was found to be $493,915 and under the conditions of this analysis would take less than two years to pay for itself. The cost of the photovoltaic system is moderately less than the dual-façade, but would not offer the owner significant returns for over 17 years after installation. However, both systems could be incorporated into the building that is funded by the government and consequently a key architectural feature of the city's commitment toward energy efficient design. A survey of industry professionals was conducted and the conclusion was that the systems are either too costly or unknown of at this time. This is why it is important that the general public become aware of the potential and it may result in more owners demanding green energy.

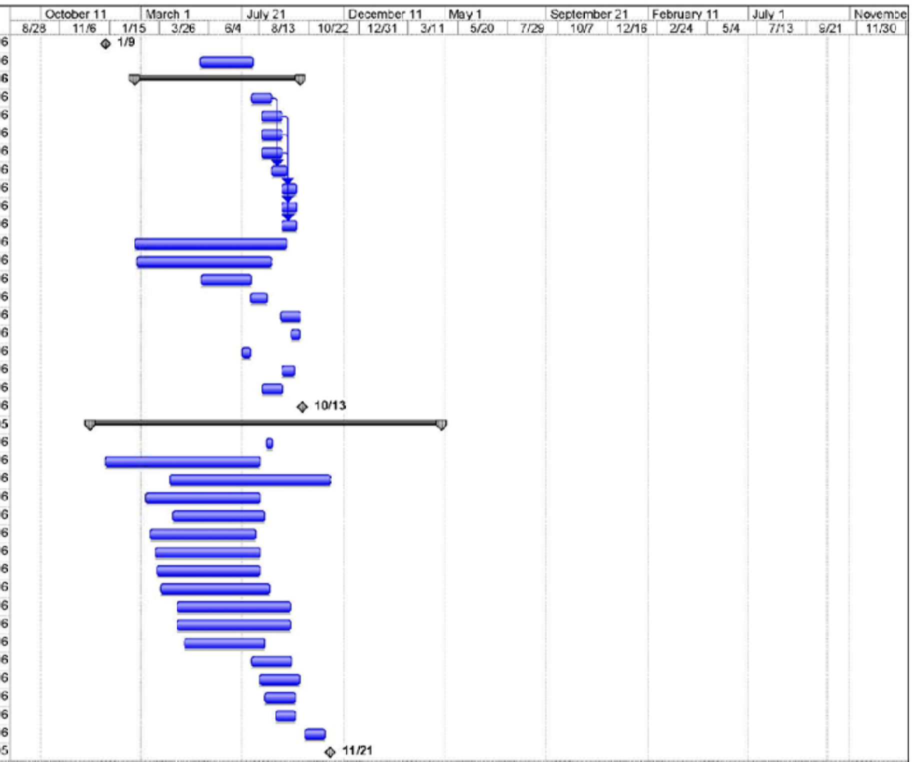
Summary and Conclusions

The Depth, or first two analyses, looked at cost and schedule impacts and the potential savings through the use of the IDC and panelized construction. Analysis One, Interdisciplinary Document Coordination, explored the utilization of further document review in the beginning of a project to lessen the number of RFIs and change orders during construction. A detailed explanation of the IDC was provided and a project specific example was explained. Through the use of RS Means and statistical data from previous projects, the IDC was found to offer significant savings to justify the 10% fee for the service. Analysis Two, Panelized Construction, weighed the potential benefits in term of cost and schedule by replacing the architectural cast stone veneer with precast panels. Dimensional limitations of the factory made panels concluded the manner in which a project team determines the best course of erection is important to save both time and money. The cost was found to save the project approximately $310,000. The schedule impact was inconclusive, since the veneer was not on the critical path. However, the ability to have a less congested site without scaffolding for an extra 37 days is an unquantifiable advantage to the project team's success.

The Breadth topics, or last two analyses, looked at a structural and mechanical modification without the architectural aesthetics of the building being compromised. Analysis Three, Pedestrian Rerouting, dealt with relocating the travel path for the general public in hopes to create a safer site while improving the structural predictability of the entire building. Utilization of computer software, STAAD Pro, found that extending the truss and eliminating the existing concrete piers was plausible and even would lower the total cost of construction by $391,997. Analysis Four, Alternative Glazing, examined how the building envelope could be altered to create a more efficient building. The first section looked at a century old construction technique of dual-facades and the associated thermal advantages. The research revealed that the idea was not only cost effective but also had noise reduction capabilities. Secondly photovoltaic solar cells were originally intended to productively aid the buildings electrical demand. The findings showed that the percent change on the building demand was too low and would significantly increase frontend costs with installation ranging from $6,000 - $10,000/kW. The total cost of the system presented in the analysis would have incurred the project $438,950 and the earliest the system would pay for itself would be 17 years. Therefore, the system could be used to educate the public of the future building techniques that they may see in a world with ever rising energy costs.

Appendix A: Detailed Schedule

ID	Task Name	Duration	Start
1	NTP 1A	1 day	Mon 1/9/06
2	Approve Security Dwgs	54 days	Tue 5/23/06
3	**Electrical Work**	**167 days**	**Mon 2/20/06**
4	Submit O&M Menuals - Switch Gear/ Panel Boards	20 days	Thu 8/3/06
5	Submit O&M Menuals - CCTV	21 days	Thu 8/17/06
6	Submit O&M Menuals - Access Control	21 days	Thu 8/17/06
7	Submit O&M Menuals - Fire Alarm	21 days	Thu 8/17/06
8	Approve O&M Manuals - Switch Gear/ Panel Board	16 days	Thu 8/31/06
9	Approve O&M Manuals - CCTV	15 days	Fri 9/15/06
10	Approve O&M Manuals - Access Control	15 days	Fri 9/15/06
11	Approve O&M Manuals - Fire Alarm	15 days	Fri 9/15/06
12	Electrical Procument Phase 1A	154 days	Mon 2/20/06
13	Electrical Demolition Phase 1A	135 days	Thu 2/23/06
14	Install New Electrical Panels	51 days	Wed 5/24/06
15	Pull Cable Install New Temporary Power	17 days	Wed 8/2/06
16	Install Temp Lights on Fence Roof Top	20 days	Wed 9/13/06
17	New Fire Alarm System in Existing Stair Towers	8 days	Thu 9/28/06
18	Install New CCTV	8 days	Fri 7/21/06
19	Install New Light Poles in Light Poles in Parking Lot	12 days	Fri 9/15/06
20	Demo and Relocate light/power in Ext. Bridge	21 days	Fri 8/18/06
21	Electrical Construction Phase 1A Complete	1 day	Fri 10/13/06
22	**Stuctural Work**	**355 days**	**Mon 12/19/05**
23	Install Loop Detection in Parking Lot	6 days	Thu 8/24/06
24	Submit Structural Dwgs. And Submittals	156 days	Mon 1/9/06
25	Approve Structural Dwgs. And Submittals	163 days	Mon 4/10/06
26	Fab/ Del Misc. Metals	115 days	Tue 3/7/06
27	Fab/ Del Steel Pile	92 days	Fri 4/14/06
28	Fab/ Del Timber Piles	106 days	Tue 3/14/06
29	Fab/ Del GWB	105 days	Tue 3/21/06
30	Fab/ Del EDPM Water Proofing & Roofing	103 days	Thu 3/23/06
31	Fab/ Del Precast Concrete	110 days	Tue 3/28/06
32	Fab/ Del Structural Steel - Phase 3	114 days	Thu 4/20/06
33	Fab/ Del Structural Steel - Phase 4	114 days	Thu 4/20/06
34	Fab/ Del D & E Stairs	81 days	Mon 5/1/06
35	Fab/Del Metal Decking	41 days	Thu 8/3/06
36	Fab/ Del Structural Steel - Phase 1	41 days	Mon 8/14/06
37	Fab/ Del Rebar for Pile Caps and Grade Beams	31 days	Tue 8/22/06
38	Fab/ Del Structural Steel - Phase 2	20 days	Wed 9/6/06
39	Fab/ Del Steel Trusses	20 days	Wed 10/18/06
40	Steel Procurment Completed Phase 1A	243 days	Mon 12/19/05

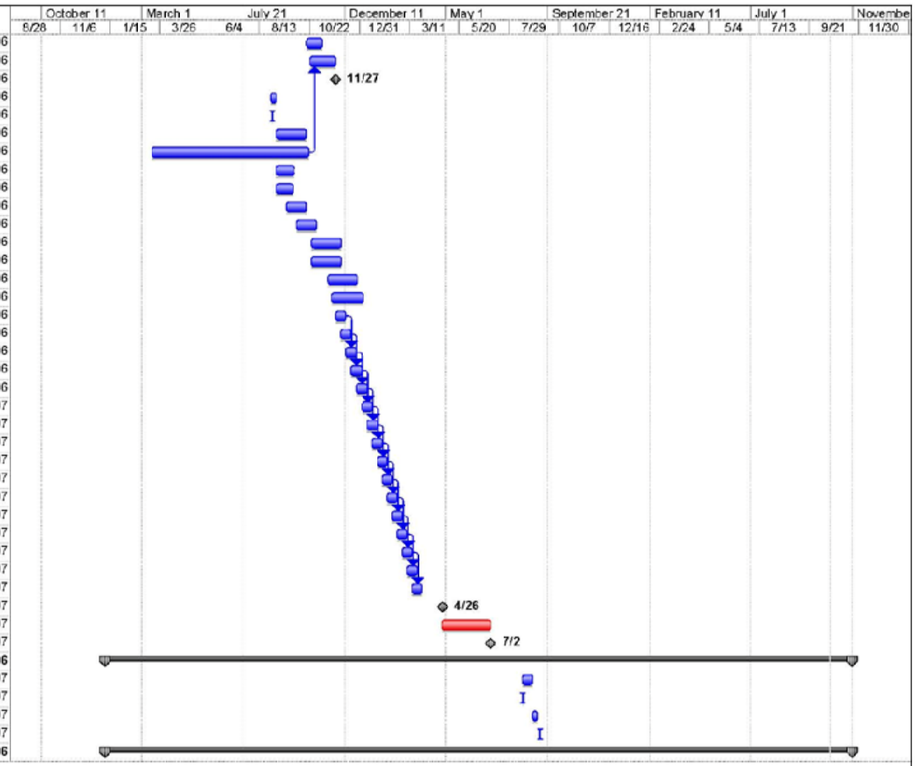


Project: Schedule BETTER WORK
Date: Mon 10/20/08

Task, Split, Progress, Milestone, Summary, Project Summary, External Tasks, External Milestone, Deadline

Page 1

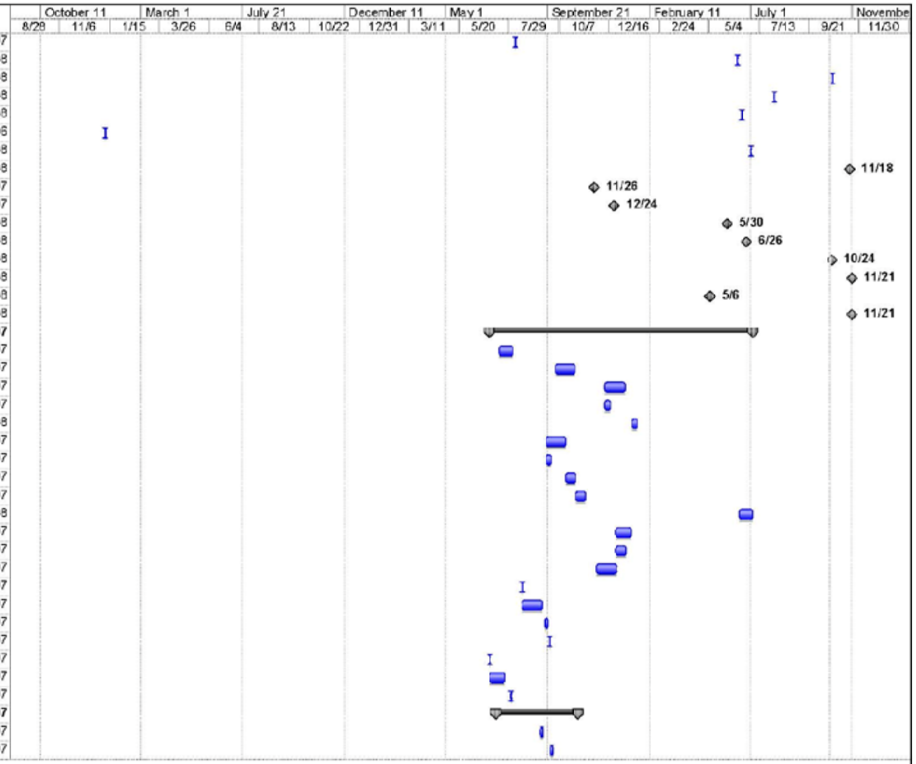
ID	Task Name	Duration	Start
41	Decommission and Remove Existing Stairs	16 days	Wed 10/18/06
42	Demolition Link Bridge	27 days	Mon 10/23/06
43	Demolition Phase 1A Complete	1 day	Mon 11/27/06
44	Install Construction Fencing & Jersey Barriers	6 days	Tue 8/29/06
45	Grade Site	1 day	Thu 8/31/06
46	Install New Stair Towers	30 days	Wed 9/6/06
47	Temporary Pedestrian Bridge Construction	158 days	Wed 3/15/06
48	Steel Piles Col A thru D	18 days	Wed 9/6/06
49	Timber Piles Col A thru D	17 days	Wed 9/6/06
50	Foundations & Pile Caps Col A thru D	20 days	Wed 9/20/06
51	Grade Beams & Piers Col A thru D	20 days	Wed 10/4/06
52	Steel Piles Col D thru J	31 days	Wed 10/25/06
53	Timber Piles Col D thru J	31 days	Wed 10/25/06
54	Foundations & Pile Caps Col D thru J	31 days	Fri 11/17/06
55	Grade Beams & Piers Col D thru J	33 days	Wed 11/22/06
56	Erect Structural Steel - Col A-D, Row 5-10	10 days	Tue 11/28/06
57	Framing and Decking Col A-D, Rows 5-10	10 days	Tue 12/5/06
58	Erect Structural Steel - Col A-D, Row 1-5	11 days	Tue 12/12/06
59	Framing and Decking Col A-D, Rows 1-5	12 days	Tue 12/19/06
60	Erect Structural Steel - Col D-H, Row 10.4-9	11 days	Wed 12/27/06
61	Framing and Decking Col D-H, Rows 10.4-9	10 days	Thu 1/4/07
62	Erect Structural Steel - Col D-H, Row 9-7	10 days	Thu 1/11/07
63	Framing and Decking Col D-H, Rows 9-7	10 days	Thu 1/18/07
64	Erect Structural Steel - Col D-H, Row 7-5	10 days	Thu 1/25/07
65	Framing and Decking Col D-H, Rows 7-5	10 days	Thu 2/1/07
66	Erect Structural Steel - Col D-H, Row 5-3	10 days	Thu 2/8/07
67	Framing and Decking Col D-H, Rows 5-3	10 days	Thu 2/15/07
68	Erect Structural Steel - Col D-H, Row 3-1	10 days	Thu 2/22/07
69	Framing and Decking Col D-H, Rows 3-1	10 days	Thu 3/1/07
70	Erect Structural Steel - Col D-H, Row 1-0.4	10 days	Thu 3/8/07
71	Framing and Decking Col D-H, Rows 1-0.4	10 days	Thu 3/15/07
72	Construction Complete Package 1A	1 day	Thu 4/26/07
73	Availible Float	48 days?	Thu 4/26/07
74	NTP 1B	1 day	Mon 7/2/07
75	**1B Aiport Terminal Connector Building**	**753 days?**	**Mon 1/9/06**
76	Engineering Review Submittal	10 days	Fri 8/17/07
77	Submittal Issued by Subcontractor	1 day	Fri 8/17/07
78	Gilbane Review & Approve Submittal	5 days	Fri 8/31/07
79	Subcontractor Procure & Deliver Material	1 day	Mon 9/10/07
80	**Pkg 1B: General Contractor**	**753 days?**	**Mon 1/9/06**



Project: Schedule BETTER WORK
Date: Mon 10/20/08

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

Page 2



ID	Task Name	Duration	Start
81	Area Brought to Sub Grade (Pkg. 1A)	1 day	Tue 6/7/07
82	1st Floor Substantial Completion	1 day	Fri 6/13/08
83	Cert. of Occupancy - Concession Offices	1 day	Fri 10/24/08
84	2nd Floor Substantial Completion	1 day	Mon 8/4/08
85	Substantial Completion Level 3 Office Area	1 day	Thu 6/19/08
86	Temporary Certificate of Occupancy Office Spa	1 day?	Mon 1/9/06
87	4th Floor Substantial Completion	1 day	Wed 7/2/08
88	Milestone 1a: Complete Sec. Chkpt. / Opening	0 days	Tue 11/18/08
89	Milestone 1b : Complete Under-Slab Utilities	0 days	Mon 11/26/07
90	Milestone 1c: Complete Level 2 Slab on Deck	0 days	Mon 12/24/07
91	Milestone 1g: Cmplt Concession Area Shell Sp	0 days	Fri 5/30/08
92	Milestone 1h: Complete Level 3 Office Area	0 days	Thu 6/26/08
93	Milestone 1i: Complete Concession Offices	0 days	Fri 10/24/08
94	Milestone 1j: Relocate Project Mgmt Office	0 days	Fri 11/21/08
95	Milestone 2c: CWS Available from STP	0 days	Tue 5/6/08
96	Opening Day - Pkg 1B	0 days	Fri 11/21/08
97	**Pkg 1B: Div 1- General Requirements**	**265 days**	**Mon 7/2/07**
98	Mobilization	15 days	Mon 7/16/07
99	Demo CMU Block Walls Existing Building	20 days	Tue 10/2/07
100	Construct Permanent Egress Corridors D & E	20 days	Tue 12/11/07
101	Remove Temporary Egress Corridors D & E	6 days	Tue 12/11/07
102	Concrete Infill of 1st Temporary Bridge Area	5 days	Fri 1/18/08
103	Studs for Temporary Bridge	20 days	Wed 9/19/07
104	Insulation for Temporary Bridge	6 days	Wed 9/19/07
105	Drywall for Temporary Bridge	10 days	Wed 10/17/07
106	Drywall Ceilings for Temporary Bridge	10 days	Wed 10/31/07
107	Demo 2nd Temporary Bridge	15 days	Mon 6/16/08
108	Demo Current Temporary Bridge	15 days	Wed 12/26/07
109	Remove Precast Planking and Columns	10 days	Wed 12/26/07
110	Demo Walls Existing Building	20 days	Thu 11/29/07
111	Submittal Issued by Subcontractor	1 day	Fri 8/17/07
112	Engineering Review Submittal	20 days	Fri 8/17/07
113	Gilbane Review & Approve Submittal	5 days	Mon 9/17/07
114	Subcontractor Procure & Deliver Material	1 day	Mon 9/24/07
115	Submittal Issued by Subcontractor	1 day	Mon 7/2/07
116	Engineering Review Submittal	16 days	Mon 7/2/07
117	Subcontractor Procure & Deliver Material	1 day	Wed 8/1/07
118	**Pkg 1B: Div 2- Site Construction**	**83 days**	**Wed 7/11/07**
119	Fill Stone Subbase Quad 1	4 days	Tue 9/11/07
120	Fill Stone Subbase Quad 2	4 days	Tue 9/25/07

Project: Schedule BETTER WORK
Date: Mon 10/20/08

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

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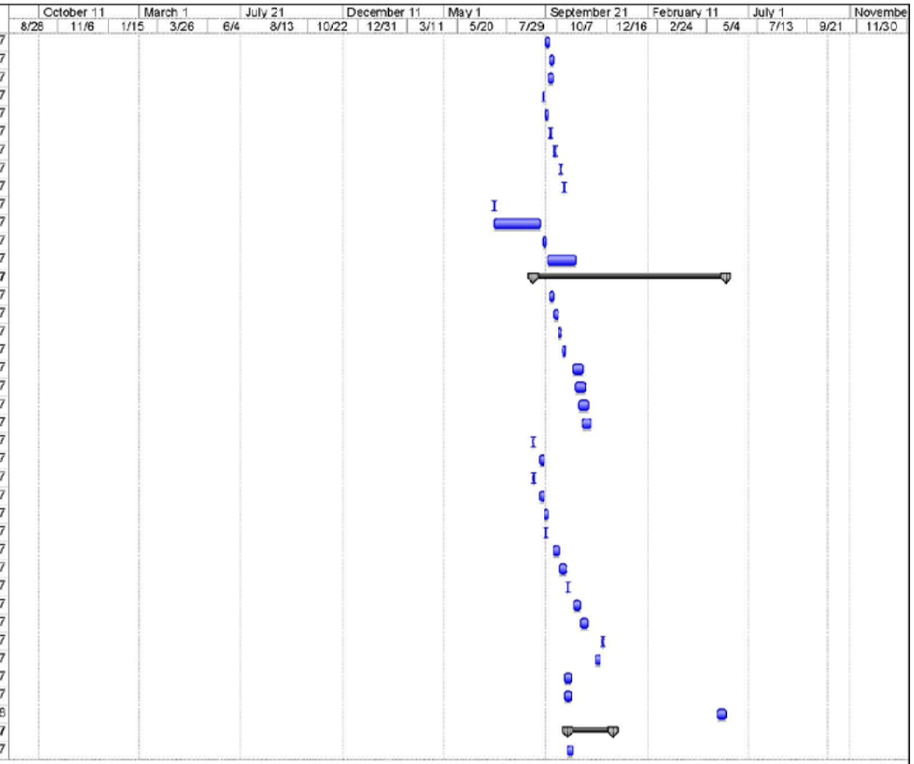
ID	Task Name	Duration	Start
121	Fill Stone Subbase Quad 3	4 days	Fri 9/21/07
122	Fill Stone Subbase Quad 4	4 days	Thu 9/27/07
123	Remove Grade Beam Existing Building	5 days	Tue 9/25/07
124	Concrete Pile Caps Quad 1	2 days	Mon 9/17/07
125	Concrete Pile Caps Quad 2	2 days	Fri 9/21/07
126	Concrete Pile Caps Quad 3	2 days	Thu 9/27/07
127	Concrete Pile Caps Quad 4	2 days	Wed 10/3/07
128	Drive Timber Piles at DT1072	1 day	Fri 10/12/07
129	Drive Timber Piles at ET1072	1 day	Wed 10/17/07
130	Submittal Issued by Subcontractor	1 day	Wed 7/11/07
131	Engineering Review Submittal	47 days	Wed 7/11/07
132	Gilbane Review & Approve Submittal	5 days	Mon 9/17/07
133	Subcontractor Procure & Deliver Material	30 days	Mon 9/24/07
134	**Pkg 1B: Div 3 - Concrete**	**194 days**	**Tue 9/4/07**
135	Rebar for SOG Quad 1	4 days	Thu 9/27/07
136	Rebar for SOG Quad 2	4 days	Wed 10/3/07
137	Rebar for SOG Quad 3	4 days	Tue 10/9/07
138	Rebar for SOG Quad 4	4 days	Mon 10/15/07
139	Pour SOG Quad 1	10 days	Tue 10/30/07
140	Pour SOG Quad 2	10 days	Fri 11/2/07
141	Pour SOG Quad 3	10 days	Wed 11/7/07
142	Pour SOG Quad 4	10 days	Mon 11/12/07
143	Wire Mesh for SOD North Side of Bridge	1 day	Tue 9/4/07
144	Form and Pour SOD North Side of Bridge	4 days	Thu 9/13/07
145	Rebar for SOD South Side of Bridge	2 days	Tue 9/4/07
146	Form and Pour SOD South Side of Bridge-1st Pour	4 days	Thu 9/13/07
147	Form and Pour SOD South Side of Bridge-2nd Pour	4 days	Wed 9/19/07
148	Wire Mesh for SOD	1 day	Fri 9/21/07
149	Form and Pour SOD (1st Pour)	7 days	Tue 10/2/07
150	Form and Pour SOD (2nd Pour)	7 days	Thu 10/11/07
151	Wire Mesh for SOD	1 day	Mon 10/22/07
152	Form and Pour SOD (1st Pour)	7 days	Wed 10/31/07
153	Form and Pour SOD (2nd Pour)	7 days	Fri 11/9/07
154	Pour Concrete Slab Mezzanines	2 days	Mon 12/10/07
155	Pour Concrete Floor for Walkable Ceilings	5 days	Fri 11/30/07
156	Form and Pour Foundations/Slab at DT1072	7 days	Thu 10/18/07
157	Form and Pour Foundations/Slab at ET1072	7 days	Thu 10/18/07
158	Install Site Masonry Walls	10 days	Mon 5/19/08
159	**Pkg 1B: Div 4 - Masonry**	**46 days**	**Mon 10/22/07**
160	Block Walls to Grade Quad 1	6 days	Mon 10/22/07



Project: Schedule BETTER WORK
Date: Mon 10/20/08

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

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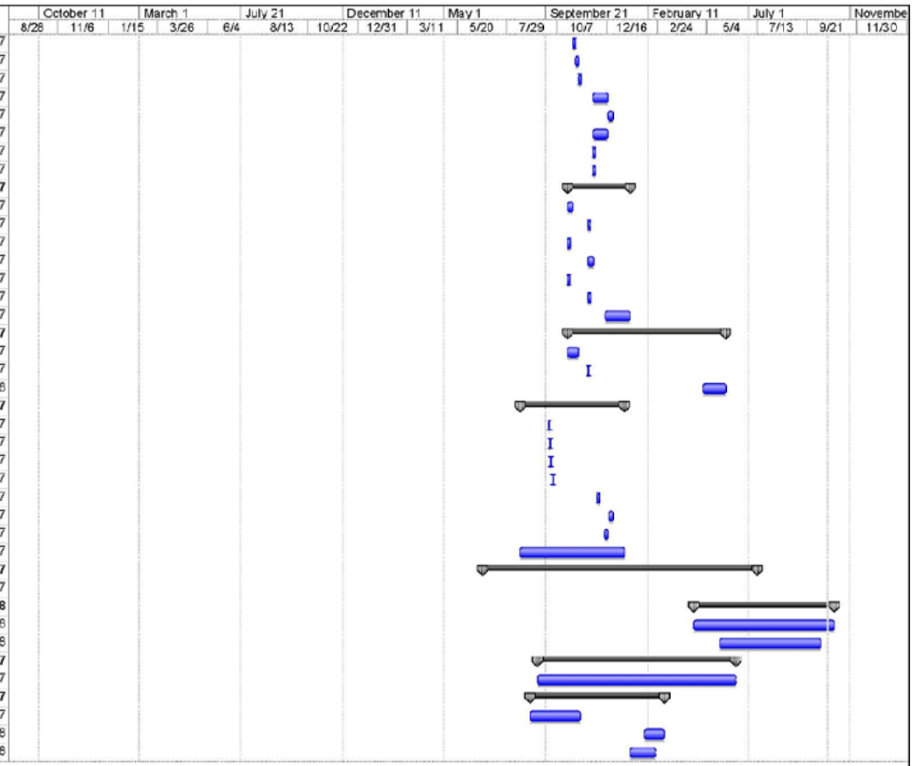
ID	Task Name	Duration	Start
161	Block Walls to Grade Quad 2	3 days	Tue 10/30/07
162	Block Walls to Grade Quad 3	3 days	Fri 11/2/07
163	Block Walls to Grade Quad 4	3 days	Wed 11/7/07
164	Interior Masonry Walls	15 days	Tue 11/27/07
165	Interior Masonry Walls	5 days	Tue 12/18/07
166	Interior Masonry Walls	15 days	Tue 11/27/07
167	Masonry Shaft Walls	3 days	Tue 11/27/07
168	Masonry Shaft Walls	3 days	Tue 11/27/07
169	**Pkg 1B: Div 5- Metals**	**64 days**	**Mon 10/22/07**
170	Exterior Walls - 3rd Floor	6 days	Mon 10/22/07
171	Exterior Walls - 4th Floor	3 days	Tue 11/20/07
172	Exterior Walls - 3rd Floor	4 days	Mon 10/22/07
173	Exterior Walls - 4th Floor	6 days	Tue 11/20/07
174	Exterior Walls - 3rd Floor	3 days	Mon 10/22/07
175	Exterior Walls - 4th Floor	4 days	Tue 11/20/07
176	Roof Misc. Metals	25 days	Fri 12/14/07
177	**Pkg 1B: Div 6- Wood & Plastics**	**160 days?**	**Mon 10/22/07**
178	Roof Blocking 3rd Floor	12 days	Mon 10/22/07
179	Roof Blocking 4th Floor	1 day?	Tue 11/20/07
180	Build Concession Walls	24 days	Tue 4/29/08
181	**Pkg 1B: Div 7- Thermal and Moisture Protection**	**104 days**	**Fri 8/17/07**
182	SOG Vapor Barrier Quad 1	1 day	Wed 9/26/07
183	SOG Vapor Barrier Quad 2	1 day	Thu 9/27/07
184	SOG Vapor Barrier Quad 3	1 day	Fri 9/28/07
185	SOG Vapor Barrier Quad 4	1 day	Mon 10/1/07
186	Air Membrane for Block Walls	3 days	Mon 12/3/07
187	Air Membrane for Block Walls	4 days	Wed 12/19/07
188	Air Membrane for Block Walls	3 days	Thu 12/13/07
189	Fireproofing	104 days	Fri 8/17/07
190	**Pkg 1B: Div 8- Doors and Windows**	**276 days**	**Mon 6/25/07**
191	Doors/Hardware Submittals, Rough In, Install	276 days	Mon 6/25/07
192	**Pkg 1B: Div 9- Finishes**	**144 days**	**Wed 4/16/08**
193	Install Accoustical Ceiling	144 days	Wed 4/16/08
194	Install Terrazo	105 days	Thu 5/22/08
195	**Pkg 1B: Div 10- Specialties**	**200 days**	**Mon 9/10/07**
196	Procurement/ Delivery	200 days	Mon 9/10/07
197	**Pkg 1B: Div 14- Conveying Systems**	**134 days**	**Fri 8/31/07**
198	Procurement/ Delevery	50 days	Fri 8/31/07
199	Install Elevators	20 days	Thu 2/7/08
200	Install Escalators	25 days	Fri 1/18/08



Project: Schedule BETTER WORK
Date: Mon 10/20/08

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

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ID	Task Name	Duration	Start
201	**Pkg 1B: Div 16- Electrical**	**371 days**	**Mon 4/30/07**
202	Submittals, Rough in, Install	371 days	Mon 4/30/07
203	**Pkg 1B: Div 15- Mechanical**	**257 days**	**Mon 7/2/07**
204	Submittals, Rough in, Install	257 days	Mon 7/2/07
205	**Pkg 1B: Div- Plumbing and Fire Protection**	**245 days**	**Tue 7/10/07**
206	Submittals, Rough in, Install	245 days	Tue 7/10/07
207	**Pkg 1B: Special Systems**	**362 days**	**Mon 7/2/07**
208	Submittals, Rough in, Install	362 days	Mon 7/2/07

Timescale: October 11 (8/28, 11/6), March 1 (1/15, 3/26), July 21 (6/4, 8/13), December 11 (10/22, 12/31), May 1 (3/11, 5/20), September 21 (7/29, 10/7), February 11 (12/16, 2/24), July 1 (5/4, 7/13), Novembe (9/21, 11/30)

Project: Schedule BETTER WORK
Date: Mon 10/20/08

Task, Split, Progress, Milestone, Summary, Project Summary, External Tasks, External Milestone, Deadline

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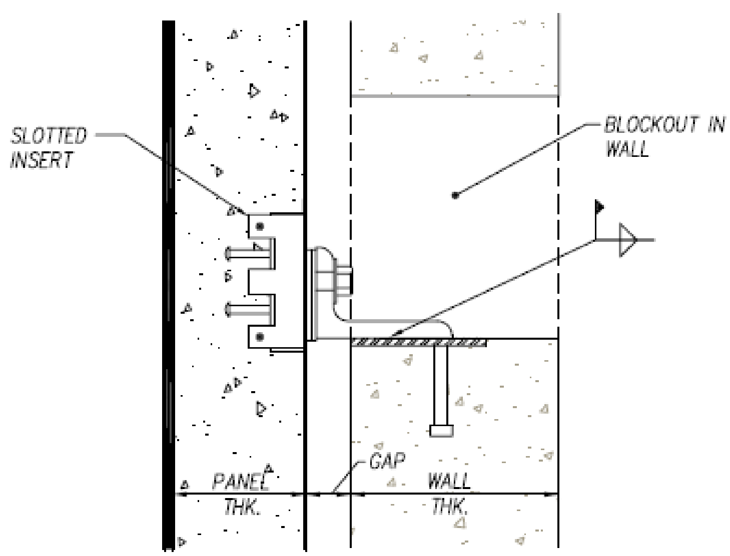
Appendix B: Precast Details

Precast Specialties Corp.

999 Adams Street, P.O. Box 86, Abington, MA 02351

TEL: (781)878-7220 FAX: (781)878-7464

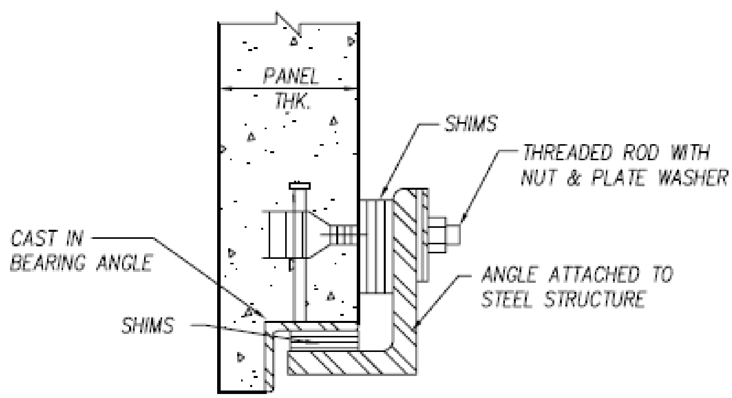


LATERAL TIEBACK TO SHEER WALL

Precast Specialties Corp.

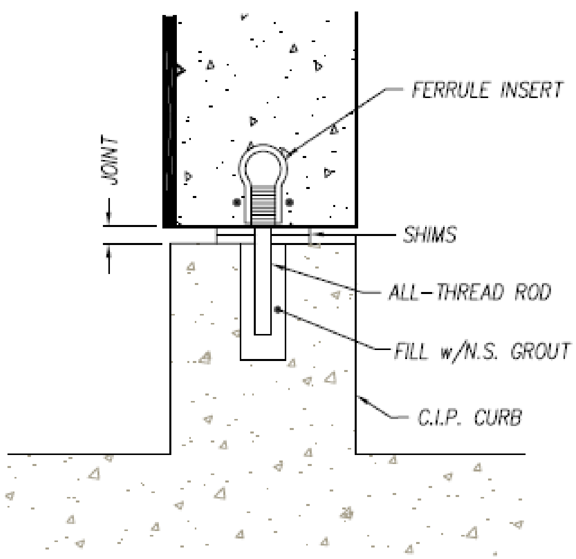
999 Adams Street, P.O. Box 86, Abington, MA 02351

TEL: (781)878-7220 FAX: (781)878-7464



LOAD BEARING CONNECTION DETAIL

Precast Specialties Corp.
999 Adams Street, P.O. Box 86, Abington, MA 02351
TEL: (781)878-7220 FAX: (781)878-7464

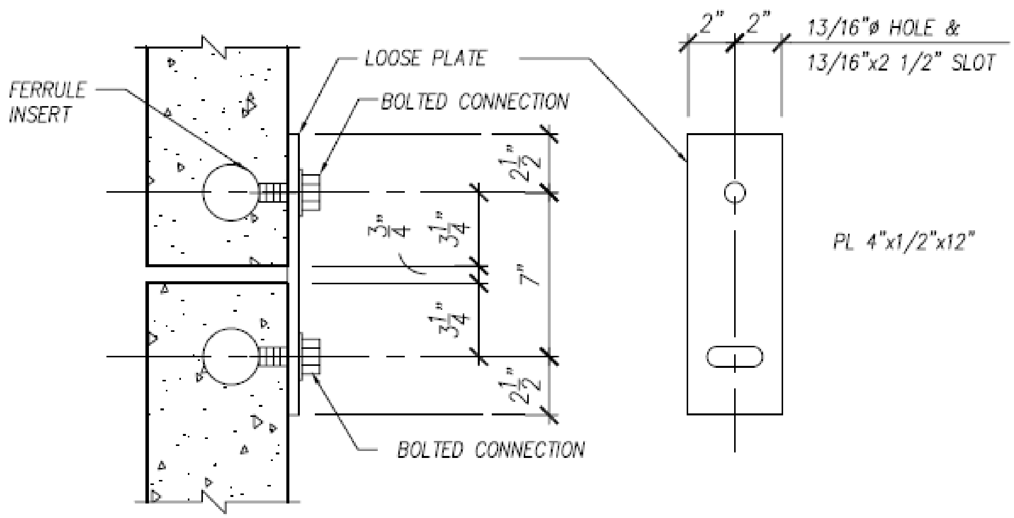


LOAD BEARING TO CAST-IN-PLACE CURB

Precast Specialties Corp.

999 Adams Street, P.O. Box 86, Abington, MA 02351

TEL: (781)878-7220 FAX: (781)878-7464



PANEL TO PANEL CONNECTION

Appendix C: Structural Results

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Job No | Sheet No 1 | Rev | Part | Job Title | Ref | By | Date 15-Feb-09 | Chd | Client | File str2.std | Date/Time 25-Feb-2009 16:16

Job Information

	Engineer	Checked	Approved
Name:			
Date:	15-Feb-09		

Structure Type	TRUSS

Number of Nodes	13	Highest Node	13
Number of Elements	21	Highest Beam	21

Number of Basic Load Cases	2
Number of Combination Load Cases	5

Included in this printout are data for:

All	The Whole Structure

Included in this printout are results for load cases:

Type	L/C	Name
Primary	1	DEAD
Primary	2	LOAD CASE 2
Combination	3	GENERATED IBC TABLE1 1
Combination	4	GENERATED IBC TABLE1 2
Combination	5	GENERATED IBC TABLE1 3
Combination	6	GENERATED IBC TABLE1 4
Combination	7	GENERATED IBC TABLE1 5

Node Displacement Summary

	Node	L/C	X (in)	Y (in)	Z (in)	Resultant (in)	rX (rad)	rY (rad)	rZ (rad)
Max X	9	2:LOAD CASE	**0.004**	-0.112	0.000	0.112	0.000	0.000	0.000
Min X	1	4:GENERATEI	**-0.134**	-0.085	0.000	0.159	0.000	0.000	0.000
Max Y	12	1:DEAD	0.000	**0.000**	0.000	0.000	0.000	0.000	0.000
Min Y	6	4:GENERATEI	-0.071	**-0.707**	0.000	0.711	0.000	0.000	0.000
Max Z	1	1:DEAD	-0.019	-0.061	**0.000**	0.064	0.000	0.000	0.000
Min Z	1	1:DEAD	-0.019	-0.061	**0.000**	0.064	0.000	0.000	0.000
Max rX	1	1:DEAD	-0.019	-0.061	0.000	0.064	**0.000**	0.000	0.000
Min rX	1	1:DEAD	-0.019	-0.061	0.000	0.064	**0.000**	0.000	0.000
Max rY	1	1:DEAD	-0.019	-0.061	0.000	0.064	0.000	**0.000**	0.000
Min rY	1	1:DEAD	-0.019	-0.061	0.000	0.064	0.000	**0.000**	0.000
Max rZ	1	1:DEAD	-0.019	-0.061	0.000	0.064	0.000	0.000	**0.000**
Min rZ	1	1:DEAD	-0.019	-0.061	0.000	0.064	0.000	0.000	**0.000**
Max Rst	6	4:GENERATEI	-0.071	-0.707	0.000	**0.711**	0.000	0.000	0.000

Print Time/Date: 25/02/2009 17:01 STAAD.Pro for Windows Release 2006 Print Run 1 of 23

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Job No | Sheet No 2 | Rev | Part | Job Title | Ref | By | Date 15-Feb-09 | Chd | Client | File str2.std | Date/Time 25-Feb-2009 16:16

Beam Displacement Detail Summary

Displacements shown in italic indicate the presence of an offset

	Beam	L/C	d (ft)	X (in)	Y (in)	Z (in)	Resultant (in)
Max X	9	2:LOAD CASE	15.389	**0.004**	-0.112	0.000	0.112
Min X	1	4:GENERATEI	10.500	**-0.134**	-0.085	0.000	0.159
Max Y	20	1:DEAD	12.500	0.000	**0.000**	0.000	0.000
Min Y	6	4:GENERATEI	15.389	-0.071	**-0.707**	0.000	0.711
Max Z	1	1:DEAD	0.000	0.000	-0.111	**0.000**	0.111
Min Z	1	1:DEAD	0.000	0.000	-0.111	**0.000**	0.111
Max Rst	6	4:GENERATEI	15.389	-0.071	-0.707	0.000	**0.711**

Beam End Displacement Summary

Displacements shown in italic indicate the presence of an offset

	Beam	Node	L/C	X (in)	Y (in)	Z (in)	Resultant (in)
Max X	9	9	2:LOAD CASE	**0.004**	-0.112	0.000	0.112
Min X	1	1	4:GENERATEI	**-0.134**	-0.085	0.000	0.159
Max Y	20	13	1:DEAD	0.000	**0.000**	0.000	0.000
Min Y	6	6	4:GENERATEI	-0.071	**-0.707**	0.000	0.711
Max Z	1	11	1:DEAD	0.000	-0.111	**0.000**	0.111
Min Z	1	11	1:DEAD	0.000	-0.111	**0.000**	0.111
Max Rst	6	6	4:GENERATEI	-0.071	-0.707	0.000	**0.711**

Beam End Force Summary

The signs of the forces at end B of each beam have been reversed. For example: this means that the Min Fx entry gives the largest tension value for an beam.

				Axial	Shear		Torsion	Bending	
	Beam	Node	L/C	Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip'in)	My (kip'in)	Mz (kip'in)
Max Fx	20	1	3:GENERATEI	**939.470**	0.000	0.000	0.000	0.000	0.000
Min Fx	13	5	4:GENERATEI	**-366.686**	0.000	0.000	0.000	0.000	0.000
Max Fy	16	2	4:GENERATEI	275.754	**31.050**	0.000	0.000	0.000	0.000
Min Fy	16	4	4:GENERATEI	275.754	**-31.050**	0.000	0.000	0.000	0.000
Max Fz	1	11	1:DEAD	657.550	0.000	**0.000**	0.000	0.000	0.000
Min Fz	1	11	1:DEAD	657.550	0.000	**0.000**	0.000	0.000	0.000
Max Mx	1	11	1:DEAD	657.550	0.000	0.000	**0.000**	0.000	0.000
Min Mx	1	11	1:DEAD	657.550	0.000	0.000	**0.000**	0.000	0.000
Max My	1	11	1:DEAD	657.550	0.000	0.000	0.000	**0.000**	0.000
Min My	1	11	1:DEAD	657.550	0.000	0.000	0.000	**0.000**	0.000
Max Mz	1	11	1:DEAD	657.550	0.000	0.000	0.000	0.000	**0.000**
Min Mz	1	11	1:DEAD	657.550	0.000	0.000	0.000	0.000	**0.000**

Print Time/Date: 25/02/2009 17:01 STAAD.Pro for Windows Release 2006 Print Run 2 of 23

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Job No | Sheet No 3 | Rev | Part | Job Title | Ref | By | Date 15-Feb-09 | Chd | Client | File str2.std | Date/Time 25-Feb-2009 16:16

Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

				Axial	Shear		Torsion	Bending	
	Beam	L/C	d (ft)	Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip'in)	My (kip'in)	Mz (kip'in)
Max Fx	20	3:GENERATEI	0.000	**939.470**	0.000	0.000	0.000	0.000	0.000
Min Fx	13	4:GENERATEI	0.000	**-366.686**	0.000	0.000	0.000	0.000	0.000
Max Fy	16	4:GENERATEI	0.000	275.754	**31.050**	0.000	0.000	0.000	0.000
Min Fy	16	4:GENERATEI	22.500	275.754	**-31.050**	0.000	0.000	0.000	0.000
Max Fz	1	1:DEAD	0.000	657.550	0.000	**0.000**	0.000	0.000	0.000
Min Fz	1	1:DEAD	0.000	657.550	0.000	**0.000**	0.000	0.000	0.000
Max Mx	1	1:DEAD	0.000	657.550	0.000	0.000	**0.000**	0.000	0.000
Min Mx	1	1:DEAD	0.000	657.550	0.000	0.000	**0.000**	0.000	0.000
Max My	1	1:DEAD	0.000	657.550	0.000	0.000	0.000	**0.000**	0.000
Min My	1	1:DEAD	0.000	657.550	0.000	0.000	0.000	**0.000**	0.000
Max Mz	1	1:DEAD	0.000	657.550	0.000	0.000	0.000	0.000	**0.000**
Min Mz	1	1:DEAD	0.000	657.550	0.000	0.000	0.000	0.000	**0.000**

Beam Maximum Moments

Distances to maxima are given from beam end A.

Beam	Node A	Length (ft)	L/C		d (ft)	Max My (kip'in)	d (ft)	Max Mz (kip'in)
1	11	10.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
2	1	19.981	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000

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Software licensed to PSUAE

Job No | Sheet No 4 | Rev | Part | Job Title | Ref | By | Date 15-Feb-09 | Chd | Client | File str2.std | Date/Time 25-Feb-2009 16:16

Beam Maximum Moments Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max My (kip'in)	d (ft)	Max Mz (kip'in)
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
3	2	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
4	3	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
5	4	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000

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Software licensed to PSUAE	Job No	Sheet No 5	Rev
	Part		
Job Title	Ref		
	By	Date 15-Feb-09	Chd
Client	File str2.std	Date/Time 25-Feb-2009 16:16	

Beam Maximum Moments Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max My (kip'in)	d (ft)	Max Mz (kip'in)
				Max +ve	0.000	0.000	0.000	0.000
6	5	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
7	6	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
8	7	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
9	8	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000

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Software licensed to PSUAE	Job No	Sheet No 6	Rev
	Part		
Job Title	Ref		
	By	Date 15-Feb-09	Chd
Client	File str2.std	Date/Time 25-Feb-2009 16:16	

Beam Maximum Moments Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max My (kip'in)	d (ft)	Max Mz (kip'in)
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
10	9	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
11	1	28.250	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
12	3	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000

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Software licensed to PSUAE	Job No	Sheet No 7	Rev
	Part		
Job Title	Ref		
	By	Date 15-Feb-09	Chd
Client	File str2.std	Date/Time 25-Feb-2009 16:16	

Beam Maximum Moments Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max My (kip'in)	d (ft)	Max Mz (kip'in)
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
13	5	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
14	7	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
15	11	17.000	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000

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Software licensed to PSUAE	Job No	Sheet No 8	Rev
	Part		
Job Title	Ref		
	By	Date 15-Feb-09	Chd
Client	File str2.std	Date/Time 25-Feb-2009 16:16	

Beam Maximum Moments Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max My (kip'in)	d (ft)	Max Mz (kip'in)
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
16	2	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
17	4	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
18	6	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATEI	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATEI	Max -ve	0.000	0.000	0.000	0.000

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Software licensed to PSUAE

Job No | Sheet No 9 | Rev
Part
Job Title | Ref
By | Date 15-Feb-09 | Chd
Client | File str2.std | Date/Time 25-Feb-2009 16:16

Beam Maximum Moments Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max My (kip'in)	d (ft)	Max Mz (kip'in)
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
19	8	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
20	1	12.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
21	10	23.000	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000

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Beam Maximum Shear Forces

Distances to maxima are given from beam end A.

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fz (kip)	d (ft)	Max Fy (kip)
1	11	10.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
2	1	19.981	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
3	2	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
4	3	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000

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Beam Maximum Shear Forces Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fz (kip)	d (ft)	Max Fy (kip)
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
5	4	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
6	5	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
7	6	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATED	Max -ve	0.000	0.000	0.000	0.000

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Beam Maximum Shear Forces Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fz (kip)	d (ft)	Max Fy (kip)
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
8	7	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
9	8	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
10	9	15.389	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATED	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000

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Beam Maximum Shear Forces Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fz (kip)	d (ft)	Max Fy (kip)
			5:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
11	1	28.250	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
12	3	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
13	5	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATE[	Max -ve	0.000	0.000	0.000	0.000

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Client

Beam Maximum Shear Forces Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fz (kip)	d (ft)	Max Fy (kip)
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
14	7	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
15	11	17.000	1:DEAD	Max -ve	0.000	0.000	0.000	2.550
				Max +ve	0.000	0.000	17.000	-2.550
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	12.750
				Max +ve	0.000	0.000	17.000	-12.750
			3:GENERATE[	Max -ve	0.000	0.000	0.000	3.570
				Max +ve	0.000	0.000	17.000	-3.570
			4:GENERATE[	Max -ve	0.000	0.000	0.000	23.460
				Max +ve	0.000	0.000	17.000	-23.460
			5:GENERATE[	Max -ve	0.000	0.000	0.000	15.810
				Max +ve	0.000	0.000	17.000	-15.810
			6:GENERATE[	Max -ve	0.000	0.000	0.000	3.060
				Max +ve	0.000	0.000	17.000	-3.060
			7:GENERATE[	Max -ve	0.000	0.000	0.000	2.295
				Max +ve	0.000	0.000	17.000	-2.295
16	2	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	3.375
				Max +ve	0.000	0.000	22.500	-3.375
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	16.875
				Max +ve	0.000	0.000	22.500	-16.875
			3:GENERATE[	Max -ve	0.000	0.000	0.000	4.725
				Max +ve	0.000	0.000	22.500	-4.725
			4:GENERATE[	Max -ve	0.000	0.000	0.000	31.050
				Max +ve	0.000	0.000	22.500	-31.050
			5:GENERATE[	Max -ve	0.000	0.000	0.000	20.925
				Max +ve	0.000	0.000	22.500	-20.925
			6:GENERATE[	Max -ve	0.000	0.000	0.000	4.050
				Max +ve	0.000	0.000	22.500	-4.050
			7:GENERATE[	Max -ve	0.000	0.000	0.000	3.037
				Max +ve	0.000	0.000	22.500	-3.037

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Client

Beam Maximum Shear Forces Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fz (kip)	d (ft)	Max Fy (kip)
17	4	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	3.375
				Max +ve	0.000	0.000	22.500	-3.375
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	16.875
				Max +ve	0.000	0.000	22.500	-16.875
			3:GENERATE[	Max -ve	0.000	0.000	0.000	4.725
				Max +ve	0.000	0.000	22.500	-4.725
			4:GENERATE[	Max -ve	0.000	0.000	0.000	31.050
				Max +ve	0.000	0.000	22.500	-31.050
			5:GENERATE[	Max -ve	0.000	0.000	0.000	20.925
				Max +ve	0.000	0.000	22.500	-20.925
			6:GENERATE[	Max -ve	0.000	0.000	0.000	4.050
				Max +ve	0.000	0.000	22.500	-4.050
			7:GENERATE[	Max -ve	0.000	0.000	0.000	3.037
				Max +ve	0.000	0.000	22.500	-3.037
18	6	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	3.375
				Max +ve	0.000	0.000	22.500	-3.375
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	16.875
				Max +ve	0.000	0.000	22.500	-16.875
			3:GENERATE[	Max -ve	0.000	0.000	0.000	4.725
				Max +ve	0.000	0.000	22.500	-4.725
			4:GENERATE[	Max -ve	0.000	0.000	0.000	31.050
				Max +ve	0.000	0.000	22.500	-31.050
			5:GENERATE[	Max -ve	0.000	0.000	0.000	20.925
				Max +ve	0.000	0.000	22.500	-20.925
			6:GENERATE[	Max -ve	0.000	0.000	0.000	4.050
				Max +ve	0.000	0.000	22.500	-4.050
			7:GENERATE[	Max -ve	0.000	0.000	0.000	3.037
				Max +ve	0.000	0.000	22.500	-3.037
19	8	22.500	1:DEAD	Max -ve	0.000	0.000	0.000	3.375
				Max +ve	0.000	0.000	22.500	-3.375
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	16.875
				Max +ve	0.000	0.000	22.500	-16.875
			3:GENERATE[	Max -ve	0.000	0.000	0.000	4.725
				Max +ve	0.000	0.000	22.500	-4.725
			4:GENERATE[	Max -ve	0.000	0.000	0.000	31.050
				Max +ve	0.000	0.000	22.500	-31.050
			5:GENERATE[	Max -ve	0.000	0.000	0.000	20.925
				Max +ve	0.000	0.000	22.500	-20.925
			6:GENERATE[	Max -ve	0.000	0.000	0.000	4.050
				Max +ve	0.000	0.000	22.500	-4.050
			7:GENERATE[	Max -ve	0.000	0.000	0.000	3.037
				Max +ve	0.000	0.000	22.500	-3.037
20	1	12.500	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000

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Job Title

Client

Beam Maximum Shear Forces Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fz (kip)	d (ft)	Max Fy (kip)
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
21	10	23.000	1:DEAD	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			2:LOAD CASE	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			3:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			4:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			5:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			6:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000
			7:GENERATE[	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	0.000	0.000

Beam Maximum Axial Forces

Distances to maxima are given from beam end A.

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fx (kip)
1	11	10.500	1:DEAD	Max -ve	0.000	657.550
				Max +ve		
			2:LOAD CASE	Max -ve	0.000	12.750
				Max +ve		
			3:GENERATE[	Max -ve	0.000	920.570
				Max +ve		
			4:GENERATE[	Max -ve	0.000	809.460
				Max +ve		
			5:GENERATE[	Max -ve	0.000	801.810
				Max +ve		
			6:GENERATE[	Max -ve	0.000	789.060
				Max +ve		
			7:GENERATE[	Max -ve	0.000	591.795
				Max +ve		

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Beam Maximum Axial Forces Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fx (kip)
2	1	19.981	1:DEAD	Max -ve	0.000	25.690
				Max +ve		
			2:LOAD CASE	Max -ve	0.000	128.451
				Max +ve		
			3:GENERATEI	Max -ve	0.000	35.966
				Max +ve		
			4:GENERATEI	Max -ve	0.000	236.350
				Max +ve		
			5:GENERATEI	Max -ve	0.000	159.279
				Max +ve		
			6:GENERATEI	Max -ve	0.000	30.828
				Max +ve		
			7:GENERATEI	Max -ve	0.000	23.121
				Max +ve		
3	2	15.389	1:DEAD	Max -ve		
				Max +ve	0.000	-11.102
			2:LOAD CASE	Max -ve		
				Max +ve	0.000	-55.509
			3:GENERATEI	Max -ve		
				Max +ve	0.000	-15.543
			4:GENERATEI	Max -ve		
				Max +ve	0.000	-102.137
			5:GENERATEI	Max -ve		
				Max +ve	0.000	-68.832
			6:GENERATEI	Max -ve		
				Max +ve	0.000	-13.322
			7:GENERATEI	Max -ve		
				Max +ve	0.000	-9.992
4	3	15.389	1:DEAD	Max -ve	0.000	11.102
				Max +ve		
			2:LOAD CASE	Max -ve	0.000	55.509
				Max +ve		
			3:GENERATEI	Max -ve	0.000	15.543
				Max +ve		
			4:GENERATEI	Max -ve	0.000	102.137
				Max +ve		
			5:GENERATEI	Max -ve	0.000	68.832
				Max +ve		
			6:GENERATEI	Max -ve	0.000	13.322
				Max +ve		
			7:GENERATEI	Max -ve	0.000	9.992
				Max +ve		
5	4	15.389	1:DEAD	Max -ve		
				Max +ve	0.000	-1.209
			2:LOAD CASE	Max -ve		

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Beam Maximum Axial Forces Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fx (kip)
				Max +ve	0.000	-6.046
			3:GENERATEI	Max -ve		
				Max +ve	0.000	-1.693
			4:GENERATEI	Max -ve		
				Max +ve	0.000	-11.124
			5:GENERATEI	Max -ve		
				Max +ve	0.000	-7.497
			6:GENERATEI	Max -ve		
				Max +ve	0.000	-1.451
			7:GENERATEI	Max -ve		
				Max +ve	0.000	-1.088
6	5	15.389	1:DEAD	Max -ve	0.000	1.209
				Max +ve		
			2:LOAD CASE	Max -ve	0.000	6.046
				Max +ve		
			3:GENERATEI	Max -ve	0.000	1.693
				Max +ve		
			4:GENERATEI	Max -ve	0.000	11.124
				Max +ve		
			5:GENERATEI	Max -ve	0.000	7.497
				Max +ve		
			6:GENERATEI	Max -ve	0.000	1.451
				Max +ve		
			7:GENERATEI	Max -ve	0.000	1.088
				Max +ve		
7	6	15.389	1:DEAD	Max -ve	0.000	8.684
				Max +ve		
			2:LOAD CASE	Max -ve	0.000	43.418
				Max +ve		
			3:GENERATEI	Max -ve	0.000	12.157
				Max +ve		
			4:GENERATEI	Max -ve	0.000	79.889
				Max +ve		
			5:GENERATEI	Max -ve	0.000	53.839
				Max +ve		
			6:GENERATEI	Max -ve	0.000	10.420
				Max +ve		
			7:GENERATEI	Max -ve	0.000	7.815
				Max +ve		
8	7	15.389	1:DEAD	Max -ve		
				Max +ve	0.000	-8.684
			2:LOAD CASE	Max -ve		
				Max +ve	0.000	-43.418
			3:GENERATEI	Max -ve		
				Max +ve	0.000	-12.157

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Job No | Sheet No 19 | Rev | Part | Ref | By | Date 15-Feb-09 | Chd | Job Title | Client | File str2.std | Date/Time 25-Feb-2009 16:16

Beam Maximum Axial Forces Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fx (kip)
			4:GENERATEI	Max -ve		
				Max +ve	0.000	-79.889
			5:GENERATEI	Max -ve		
				Max +ve	0.000	-53.839
			6:GENERATEI	Max -ve		
				Max +ve	0.000	-10.420
			7:GENERATEI	Max -ve		
				Max +ve	0.000	-7.815
9	8	15.389	1:DEAD	Max -ve	0.000	18.576
				Max +ve		
			2:LOAD CASE	Max -ve	0.000	92.882
				Max +ve		
			3:GENERATEI	Max -ve	0.000	26.007
				Max +ve		
			4:GENERATEI	Max -ve	0.000	170.903
				Max +ve		
			5:GENERATEI	Max -ve	0.000	115.174
				Max +ve		
			6:GENERATEI	Max -ve	0.000	22.292
				Max +ve		
			7:GENERATEI	Max -ve	0.000	16.719
				Max +ve		
10	9	15.389	1:DEAD	Max -ve		
				Max +ve	0.000	-18.576
			2:LOAD CASE	Max -ve		
				Max +ve	0.000	-92.882
			3:GENERATEI	Max -ve		
				Max +ve	0.000	-26.007
			4:GENERATEI	Max -ve		
				Max +ve	0.000	-170.903
			5:GENERATEI	Max -ve		
				Max +ve	0.000	-115.174
			6:GENERATEI	Max -ve		
				Max +ve	0.000	-22.292
			7:GENERATEI	Max -ve		
				Max +ve	0.000	-16.719
11	1	28.250	1:DEAD	Max -ve		
				Max +ve	0.000	-21.857
			2:LOAD CASE	Max -ve		
				Max +ve	0.000	-109.286
			3:GENERATEI	Max -ve		
				Max +ve	0.000	-30.600
			4:GENERATEI	Max -ve		
				Max +ve	0.000	-201.086
			5:GENERATEI	Max -ve		

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Job No | Sheet No 20 | Rev | Part | Ref | By | Date 15-Feb-09 | Chd | Job Title | Client | File str2.std | Date/Time 25-Feb-2009 16:16

Beam Maximum Axial Forces Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fx (kip)
				Max +ve	0.000	-135.514
			6:GENERATEI	Max -ve		
				Max +ve	0.000	-26.229
			7:GENERATEI	Max -ve		
				Max +ve	0.000	-19.671
12	3	22.500	1:DEAD	Max -ve		
				Max +ve	0.000	-38.089
			2:LOAD CASE	Max -ve		
				Max +ve	0.000	-190.446
			3:GENERATEI	Max -ve		
				Max +ve	0.000	-53.325
			4:GENERATEI	Max -ve		
				Max +ve	0.000	-350.421
			5:GENERATEI	Max -ve		
				Max +ve	0.000	-236.154
			6:GENERATEI	Max -ve		
				Max +ve	0.000	-45.707
			7:GENERATEI	Max -ve		
				Max +ve	0.000	-34.280
13	5	22.500	1:DEAD	Max -ve		
				Max +ve	0.000	-39.857
			2:LOAD CASE	Max -ve		
				Max +ve	0.000	-199.286
			3:GENERATEI	Max -ve		
				Max +ve	0.000	-55.800
			4:GENERATEI	Max -ve		
				Max +ve	0.000	-366.686
			5:GENERATEI	Max -ve		
				Max +ve	0.000	-247.114
			6:GENERATEI	Max -ve		
				Max +ve	0.000	-47.829
			7:GENERATEI	Max -ve		
				Max +ve	0.000	-35.871
14	7	22.500	1:DEAD	Max -ve		
				Max +ve	0.000	-27.161
			2:LOAD CASE	Max -ve		
				Max +ve	0.000	-135.804
			3:GENERATEI	Max -ve		
				Max +ve	0.000	-38.025
			4:GENERATEI	Max -ve		
				Max +ve	0.000	-249.879
			5:GENERATEI	Max -ve		
				Max +ve	0.000	-168.396
			6:GENERATEI	Max -ve		
				Max +ve	0.000	-32.593

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Job Title

Client

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Part

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Beam Maximum Axial Forces Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fx (kip)
			7:GENERATEI	Max -ve		
				Max +ve	0.000	-24.445
15	11	17.000	1:DEAD	Max -ve	0.000	0.000
				Max +ve		
			2:LOAD CASE	Max -ve		
				Max +ve	0.000	-0.000
			3:GENERATEI	Max -ve	0.000	0.000
				Max +ve		
			4:GENERATEI	Max -ve	0.000	0.000
				Max +ve		
			5:GENERATEI	Max -ve	0.000	0.000
				Max +ve		
			6:GENERATEI	Max -ve	0.000	0.000
				Max +ve		
			7:GENERATEI	Max -ve	0.000	0.000
				Max +ve		
16	2	22.500	1:DEAD	Max -ve	0.000	29.973
				Max +ve		
			2:LOAD CASE	Max -ve	0.000	149.866
				Max +ve		
			3:GENERATEI	Max -ve	0.000	41.963
				Max +ve		
			4:GENERATEI	Max -ve	0.000	275.754
				Max +ve		
			5:GENERATEI	Max -ve	0.000	185.834
				Max +ve		
			6:GENERATEI	Max -ve	0.000	35.968
				Max +ve		
			7:GENERATEI	Max -ve	0.000	26.976
				Max +ve		
17	4	22.500	1:DEAD	Max -ve	0.000	38.973
				Max +ve		
			2:LOAD CASE	Max -ve	0.000	194.866
				Max +ve		
			3:GENERATEI	Max -ve	0.000	54.562
				Max +ve		
			4:GENERATEI	Max -ve	0.000	358.554
				Max +ve		
			5:GENERATEI	Max -ve	0.000	241.634
				Max +ve		
			6:GENERATEI	Max -ve	0.000	46.768
				Max +ve		
			7:GENERATEI	Max -ve	0.000	35.076
				Max +ve		
18	6	22.500	1:DEAD	Max -ve	0.000	33.509

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Job Title

Client

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Part

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Beam Maximum Axial Forces Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fx (kip)
				Max +ve		
			2:LOAD CASE	Max -ve	0.000	167.545
				Max +ve		
			3:GENERATEI	Max -ve	0.000	46.913
				Max +ve		
			4:GENERATEI	Max -ve	0.000	308.282
				Max +ve		
			5:GENERATEI	Max -ve	0.000	207.755
				Max +ve		
			6:GENERATEI	Max -ve	0.000	40.211
				Max +ve		
			7:GENERATEI	Max -ve	0.000	30.158
				Max +ve		
19	8	22.500	1:DEAD	Max -ve	0.000	13.580
				Max +ve		
			2:LOAD CASE	Max -ve	0.000	67.902
				Max +ve		
			3:GENERATEI	Max -ve	0.000	19.013
				Max +ve		
			4:GENERATEI	Max -ve	0.000	124.939
				Max +ve		
			5:GENERATEI	Max -ve	0.000	84.198
				Max +ve		
			6:GENERATEI	Max -ve	0.000	16.296
				Max +ve		
			7:GENERATEI	Max -ve	0.000	12.222
				Max +ve		
20	1	12.500	1:DEAD	Max -ve	0.000	671.050
				Max +ve		
			2:LOAD CASE	Max -ve	0.000	80.250
				Max +ve		
			3:GENERATEI	Max -ve	0.000	939.470
				Max +ve		
			4:GENERATEI	Max -ve	0.000	933.660
				Max +ve		
			5:GENERATEI	Max -ve	0.000	885.510
				Max +ve		
			6:GENERATEI	Max -ve	0.000	805.260
				Max +ve		
			7:GENERATEI	Max -ve	0.000	603.945
				Max +ve		
21	10	23.000	1:DEAD	Max -ve	0.000	671.050
				Max +ve		
			2:LOAD CASE	Max -ve	0.000	80.250
				Max +ve		

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Beam Maximum Axial Forces Cont...

Beam	Node A	Length (ft)	L/C		d (ft)	Max Fx (kip)
			3:GENERATEI	Max -ve	0.000	939.470
				Max +ve		
			4:GENERATEI	Max -ve	0.000	933.660
				Max +ve		
			5:GENERATEI	Max -ve	0.000	885.510
				Max +ve		
			6:GENERATEI	Max -ve	0.000	805.260
				Max +ve		
			7:GENERATEI	Max -ve	0.000	603.945
				Max +ve		

Reaction Summary

			Horizontal	Vertical	Horizontal	Moment		
	Node	L/C	FX (kip)	FY (kip)	FZ (kip)	MX (kip`in)	MY (kip`in)	MZ (kip`in)
Max FX	12	1:DEAD	**0.000**	671.050	0.000	0.000	0.000	0.000
Min FX	12	1:DEAD	**0.000**	671.050	0.000	0.000	0.000	0.000
Max FY	12	3:GENERATEI	0.000	**939.470**	0.000	0.000	0.000	0.000
Min FY	12	2:LOAD CASE	0.000	**80.250**	0.000	0.000	0.000	0.000
Max FZ	12	1:DEAD	0.000	671.050	**0.000**	0.000	0.000	0.000
Min FZ	12	1:DEAD	0.000	671.050	**0.000**	0.000	0.000	0.000
Max MX	12	1:DEAD	0.000	671.050	0.000	**0.000**	0.000	0.000
Min MX	12	1:DEAD	0.000	671.050	0.000	**0.000**	0.000	0.000
Max MY	12	1:DEAD	0.000	671.050	0.000	0.000	**0.000**	0.000
Min MY	12	1:DEAD	0.000	671.050	0.000	0.000	**0.000**	0.000
Max MZ	12	1:DEAD	0.000	671.050	0.000	0.000	0.000	**0.000**
Min MZ	12	1:DEAD	0.000	671.050	0.000	0.000	0.000	**0.000**

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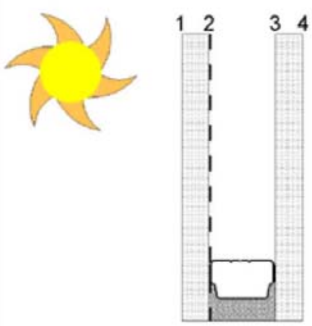
Appendix D: Glazing Specifications

Make-Up Sheet

VIRACON

Silk-Screened Low-E (VE) Insulating Glass (50% Coverage V933)
VE 2-55

Make-up:



Notes:
1/4" (6mm) green VE-55 #2 and 50% Coverage V933 #2
1/2" (13.2mm) airspace
1/4" (6mm) clear

Product	VE 2-55
Transmittance	
Visible Light	22%
Solar Energy	10%
Ultra-Violet*	3%
Reflectance	
Visible Light-Exterior	10%
Visible Light-Interior	18%
Solar Energy	8%
ASHRAE U-Value	
Winter Nighttime	0.31 Btu/(hr x sqft x °F)
Summer Daytime	0.29 Btu/(hr x sqft x °F)
European U-Value	1.6
Shading Coefficient	0.21
Relative Heat Gain	47 Btu/hr x sqft
Solar Factor (SHGC)	0.18
LSG	1.22

* Ultra-violet defined as 300 to 380 nanometers (nm)

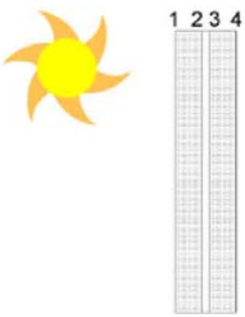
http://www.viracon.com/makeupsheet.php?id=4819 (1 of 2) [3/12/2009 5:04:04 PM]

Make-Up Sheet

VIRACON

Solarscreen Low-E (VE) Laminated Glass
VE 2-55

Make-up:



Notes:
1/4" (6mm) green VE-55 #2
.030" (.76mm) PVB
1/4" (6mm) clear

Product	VE 2-55
Transmittance	
Visible Light	42%
Solar Energy	19%
Ultra-Violet*	<1%
Reflectance	
Visible Light-Exterior	8%
Visible Light-Interior	12%
Solar Energy	8%
ASHRAE U-Value	
Winter Nighttime	0.97 Btu/(hr x sqft x °F)
Summer Daytime	0.88 Btu/(hr x sqft x °F)
European U-Value	5.4
Shading Coefficient	0.49
Relative Heat Gain	110 Btu/hr x sqft
Solar Factor (SHGC)	0.42
LSG	1

* Ultra-violet defined as 300 to 380 nanometers (nm)

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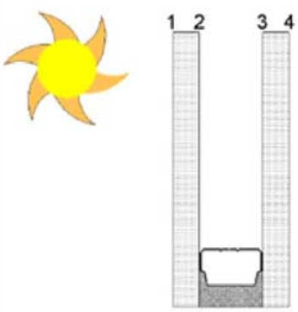
Make-Up Sheet

VIRACON

Uncoated Insulating Glass
Clear -

Make-up:



Notes:
1/4" (6mm) clear
1/2" (13.2mm) airspace
1/4" (6mm) clear

Product	Clear -
Transmittance	
Visible Light	79%
Solar Energy	61%
Ultra-Violet*	46%
Reflectance	
Visible Light-Exterior	14%
Visible Light-Interior	14%
Solar Energy	11%
ASHRAE U-Value	
Winter Nighttime	0.47 Btu/(hr x sqft x °F)
Summer Daytime	0.49 Btu/(hr x sqft x °F)
European U-Value	2.8
Shading Coefficient	0.81
Relative Heat Gain	169 Btu/hr x sqft
Solar Factor (SHGC)	0.7
LSG	1.12

* Ultra-violet defined as 300 to 380 nanometers (nm)

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